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THE LATE TREATMENT OF WAR WOUNDS.

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IT is an unfortunate but inevitable feature of the surgery of war wounds that the continuity of treatment has to be interrupted by the frequent transfer of the patient to other surgical units. The result is that the surgeon who first treats these patients is unable to follow the subsequent progress except when recovery is rapid, and often completely loses sight of the majority of, if not all, the more seriously wounded. The questions about to be discussed are based upon experience with those patients who have been evacuated to base hospitals in India.

The Sulphonamide Group of Drugs.

The introduction of "Prontosil" and the various allied compounds has given us drugs which will control septic infections and can be given orally or by injection. This has been one of the greatest of therapeutic advances in recent years and the employment of the sulphonamides in military surgery to combat infection was to be expected. A development has been the local introduction of these drugs directly into wounds; it was hoped that the maximum benefit would be derived, since the drug would be in high concentration precisely where its action was required—namely, in the wound itself. This procedure, however, involves no new principles, and might be regarded as "new antiseptics for old", or "back to Lister". The sulphonamide group of drugs, on the other hand, differs from many of the antibacterial agents hitherto employed, because, while their therapeutic activity is high, they are non-irritating to the tissues, or at least comparatively so, and the low solubility of many of them permits some (though probably not much) persistence of action. Some of the drug may be absorbed into the blood stream, where it remains still active. The method has been carried out by placing the drug directly into the wound in the form of a powder or paste. Colebrook (1940) and a number of others have reported enthusiastically on the results. It would appear that the value has so far been mainly assessed on clinical impressions of individual surgeons, and I am not aware that any precise statistical information regarding controlled series of cases is yet available. Jeffrey (1940) also strongly endorses the method and quotes Legroux, who carried out a controlled series of experiments in which it was shown that sulphanilamide locally applied to artificially produced and infected wounds in animals delayed death. The experiments would have been more convincing had the animals protected with sulphanilamide survived.

It has been suggested that under war conditions the use of the sulphanilamide "pack" might extend the time limit during which primary excision and suture of the wound could be carried out with prospect of success—for example, up to twenty-four hours—and that it might produce primary healing of wounds in which the *débridement* had been less radical than might be desired. Under rush conditions, when the surgical teams are working against the clock to give aid to as large a number of wounded as possible, the latter idea certainly does seem attractive. The soundness of such compromise is questionable, and unwarranted enthusiasm for chemotherapy is almost certain to lead to disastrous results. McMurray (1941) states that nothing is so criminal as to suggest that the excision may be done badly so long as sulphanilamide is used.

Until recently none of the late cases in which infection was established received at this hospital had been treated with sulphanilamide. Some of the men were

shockingly wounded, and it was astonishing that they had survived at all. More recently a certain proportion had been given sulphanilamide treatment. In some instances the wound had healed, but a residual disability such as a divided nerve or a stiff joint was present, necessitating the patient's evacuation. There were numerous instances in which local chemotherapy had apparently given little or no benefit. We have had a large number of patients with fractures—closed, open and infected—in which the bones had not yet united; but no instance has so far occurred in which sulphanilamide has enabled an open fracture to be converted into a closed one. No doubt such cases do exist. It is possible that many of the cases in which the sulphanilamide pack has been used with success do not reach us, and it would therefore be ridiculous to draw any conclusions. However, the fact has to be faced that a large number of cases are encountered in which wound excision has been carried out and sulphanilamide has been inserted (and in many instances has been given by mouth as well), and yet primary healing has not been secured. In the case of old wounds, in which infection is localized and the patient is in good condition and showing no pyrexia, or at the most a slight evening rise in temperature (the commonest type of wounded patient), chemotherapy is of little value. Oral administration may cause a slight fall in temperature. Local application does not as a rule appear to accelerate healing. In fact, some of the men with septic wounds had already been given courses of chemotherapy without benefit before they were received at this hospital. In those cases in which the infection is not under control and fever and inflammation of the lymphatics and regional lymphatic glands are present, sulphanilamide given orally is often of distinct and striking value. We do not now as a routine measure give sulphanilamide to wounded men, but restrict its use to those cases in which there are definite indications, and I do not think that our results have been at all adversely affected. The treatment of war wounds is primarily surgical, and the sulphanilamide group of drugs are, at the most, useful adjuvants. Further experience, and especially the results in properly controlled series of cases, will enable us to regard the value of sulphanilamide treatment of wounds in better perspective. Sulphanilamide is not the only effective therapeutic agent we have at our disposal, and for the present, until we are able to ascertain whether improved methods of using it will give a higher rate of prevention or cure of infection, or whether it will ultimately be displaced by other methods, it seems prudent to keep an open mind on the subject.

"B.I.P.P."

"B.I.P.P." was devised by Rutherford Morison, and it became popular in the last war. It enabled many wounds to be closed by primary or secondary suture, and it gave good results in wounds in which infection was established. It appears to have largely gone out of vogue, though in certain branches of surgery, such as mastoid operations, it is still popular. As far as my experience goes, it does not seem to be extensively used in the present war. In the comparatively small proportion of cases I have seen in which it was used, I cannot but notice the conspicuous excellence of the results. I have seen a number of wounds of the hands and feet, in process of healing or having healed, in which the bismuth could still be seen in X-ray films. Several patients with large wounds of the limbs, which had been treated by a combination of "B.I.P.P." and the "closed plaster" method, arrived in excellent condition, as regards both the wound itself and the patient's general well-being. The wounds, often extensive and deep, had granulated well, there was a minimum of discharge, and the plaster casts had less tendency to become foul. Some patients showed no ill effects, even though "B.I.P.P." had been inserted in quantities sufficient to prevent radiography through the plaster cast. Attempts are being made by Gordon-Watson (1941) and others to revive interest in this preparation, and in my opinion their efforts are opportune. "Z.I.P.P." is a modification, in which the bismuth is replaced by zinc oxide; this has been reported upon favourably by W. K. Connell (1940) and J. H. C. Clarke (1940). It is held to be more effective than "B.I.P.P." and less likely to cause iodoform poisoning. Both of these observers state that "Z.I.P.P." is an efficient deodorant when used in conjunction with the "closed plaster" method of wound management. At this hospital we frequently employ "B.I.P.P." in wound dressings, especially for those wounds in which bone is exposed, and we find it extremely valuable.

Other Agents Used in Wound Treatment.

Acriflavine is a feeble antiseptic, and it is largely used in simple solutions or as an oily emulsion which will be referred to later. Cod liver oil is occasionally useful, but its expense renders it of limited applicability. Hypertonic solutions of magnesium sulphate and sodium sulphate often fail to produce much benefit, and their use is largely excluded by the "closed plaster" method. Eusol, "Dettol" and "Lysol" will be referred to again. Urea gives excellent results, especially in foul and sloughing wounds Pure urea should be introduced directly into the wound, which should then be covered with some impervious material such as jaconet or rubber. No gauze should be included between the waterproof material and the wound surface. Urea treatment can with advantage be combined with the "closed plaster" method. Urea has some deodorant power. I have seen no wounds treated with the new antibacterial agents such as "Penicillin", "Azochloramide", zinc peroxide, allantoin, "Zephiran" *et cetera*.

One cannot fail to be impressed with the astonishingly rapid healing of wounds which sometimes follows accidental infestation with maggots. Deliberate introduction of "surgical maggots" into wounds is little practised at present, since it is so distasteful to all concerned including the patient himself. The method might be revived and used in suitable cases, the patients being segregated in a special room. Allantoin is said to be excreted by maggots, and now that this compound is being placed on the market as a pure drug, it offers considerable promise if it will give the same results as the maggots themselves.

The "Closed Plaster" Treatment of Wounds.

The "closed plaster" method forms the basis of all contemporary treatment of war wounds including compound fractures. Not only is the method rewarded amply by the excellence of the results obtained, but it involves the minimum of labour and therefore makes less demands on the surgical, anæsthetic and nursing staff. It also permits seriously wounded men to be transported in comfort to places of comparative safety, where they can more advantageously be dealt with, and this is a point of supreme importance in modern warfare. Moreover, many patients who in former years would be confined to bed for lengthy periods become at once ambulant. The method was devised by Winnett Orr and had considerable vogue in the United States of America, and it appears to have been used with success by a number of surgeons in India for some time. It does not seem to have been particularly popular in Great Britain or Europe until recently, though it has been advocated by certain enthusiasts like Hey Groves and others. It has become the standard method since the publication of Trueta's (1940) experiences in the Spanish Civil War. The speed with which Trueta's methods have been taken up and the sudden spate of literature on a method which to American surgeons is already accepted treatment, has apparently caused some surprise. "Heavens and earth!" writes Evarts Graham (1940), "this is practically the Orr treatment of course. . . ."

Experience with war wounds shows the "closed plaster" method to be of inestimable value. The wounds heal readily, fractures usually unite satisfactorily and the ultimate functional results are on the whole very good. The patient is free from pain, his general well-being is usually excellent and he is spared the horror of frequent dressings. In the last war nitrous oxide was regularly employed for painful dressings, but now it is rarely required. The best results are undoubtedly secured when

the original Orr technique is strictly followed. Trueta packed the wounds with dry gauze and fashioned the plaster cast from a piece of flannel impregnated with plaster paste. His method combines simplicity with speed, and obviates the necessity of keeping a stock of prepared plaster bandages on hand. Moreover, these casts do not completely encircle the limb and there is little danger of interference with circulation. Casts prepared in this manner are surprisingly light and strong. Much better results are obtained when the gauze is impregnated with "Vaseline" as practised by Orr, or with "B.I.P.P.". Less pus is produced, the wound heals more rapidly, and the plaster cast can remain on much longer before the smell becomes offensive. Gauze, like any other cloth, is strongly irritating to tissues unless its "foreign body" effect is mitigated by the incorporation of some bland substance within its meshes. The pyogenic properties of the forgotten swab in the abdomen are well known, and writers on military surgery stress the importance of removal of any pieces of clothing which happen to be driven into a wound. Why put more in? The acriflavine emulsion gives no better results than when plain gauze is used. The emulsion is rapidly washed out of the layers in contact with the wound by the discharges.

Once a wound has been treated and the part encased in plaster, the cast, within limits, should be left alone as long as possible. The smell should be ignored, and any discharge coming away from the edge of the cast, or from where the cast has been split, can be wiped away. Frequent changes of plaster cast are not recommended. I do find, however, that often there is a tendency to go to the opposite extreme and leave the casts on too long. The following are the conditions which I consider to be indications for removal, and if necessary renewal, of the cast:

1. If damage to the cast by breakage or wear, or softening from excessive discharge or soakage of "Vaseline" into the plaster occurs, the cast no longer efficiently immobilizes the limb and a fresh one is needed.

2. Excessive odour is usually accompanied by sufficient softening to render the cast inefficient. In any case, a persistent objectionable stench often causes the patient to lose his appetite and to develop neurotic symptoms. A foul smell develops more rapidly under tropical conditions. The nuisance to others has to be considered in addition.

3. Excessive soakage of infective material renders the outside of the cast septic, and infection, especially *Bacillus pyocyaneus*, is apt to be conveyed to other wounds, dressings, instruments *et cetera* by flies, with the resulting danger of cross-infection.

4. A dull, throbbing ache under the plaster cast remote from the wound usually indicates that a boil has developed. A window may suffice, but often the cast has to be changed.

5. A sudden, sharp, intermittent, "knife-like" pain at the site of an infected comminuted fracture indicates that a piece of bone has been extruded. The cast must be changed.

6. An exacerbation of the signs of sepsis developing when the cast has been on for some time is not an indication for immediate dosage with "M & B 693". The cast should be removed forthwith and the wound carefully examined and surgically treated according to circumstances. Only when this has been done and a fresh cast applied should the question of giving sulphanilamide be entertained. Rises in temperature immediately following the application of a cast do not, however, call for immediate interference.

7. Secondary hæmorrhage demands immediate removal of the plaster cast, and arrest. In wounds in which secondary hæmorrhage from a large vessel is a possibility, the "closed plaster" method should be used with caution, since fatal hæmorrhage may occur before the cast can be removed.

8. Dermatitis sometimes develops from contact of the discharges with healthy skin. Often it is very severe. One then has to choose between reapplication of the plaster cast after emollients have been smeared on the affected skin, the cutting of a window to allow escape of pus, or the discarding of the plaster altogether and treatment of the wound by some other method, if necessary with splints. Böhler advocates the treatment of all infected fractures with a window in the plaster cast to allow escape of pus, while Trueta on the other hand condemns the procedure, stating that it abolishes the main advantages of immobilization and even pressure for which the plaster cast was applied.

9. Pain around bony prominences indicates faulty application of the cast and calls for removal, or else the plaster may be sawn and cut away from the affected portion.

10. Swelling or interference with circulation in the parts distal to the cast also usually indicates faulty technique. Longitudinal splitting of the cast will as a rule put matters right. In cases in which swelling is to be anticipated, the cast should be split as soon as it has been applied.

11. When a wound is believed to be well on the way to healing, the cast can be taken off to allow inspection. The final stages of wound repair do not require a plaster cast unless a fracture is present.

On the removal of a plaster cast on account of excessive odour or excessive discharge, it is advisable to inspect the wound carefully for sloughs, sequestra and unabsorbable sutures. Flakes or inspissated pus are picked off the skin with forceps or gently sponged away with eusol, weak "Lysol" or "Dettol". The skin is then swabbed with alcohol and dried with hot air. The subsequent plaster cast seldom becomes foul before three or four weeks. I endeavour to avoid changing the casts in less than three weeks, but unless a fracture is present I prefer not to leave them for more than about four or five weeks. It is absurd to assume that pus in contact with the wound is completely innocuous, let alone beneficial, when it can often be observed to be damaging healthy skin. Severe reactions follow the changing of casts in about 2% of all cases. Most of them appear to be due to the unmasking of a latent chronic abscess or a collection of pus which has become walled off from the main wound. I now always open the plaster cast at once in such circumstances, and generally the quantity and appearance of the pus indicate that it is not fresh. Occasionally the tracks from which Steinmann's pins have been removed become infected and develop abscesses, which clear up rapidly when incised and packed. I have seen the healed wounds of compound fractures break down superficially from the continued moist condition produced by the presence of plaster. The plaster itself is commonly heavily infected with spores and organisms, though it is rare to culture from it the known pathogenic varieties. No doubt the putrefactive organisms come from the plaster.

Final Treatment of Wounds.

When a wound has granulated almost up to the surface, the granulations are healthy—not the cyanotic, foul-smelling gelatinous variety which can be wiped out with a swab—and induration and swelling have largely subsided, it will heal more rapidly if the plaster cast is discarded, provided that there is no fracture which demands further immobilization. Good and often quick results are obtained from a modification of a method employed by Hamilton Russell.[1] This consists of the conversion of an

[1] The late R. Hamilton Russell, of Melbourne, himself a former house surgeon of Lister, abhorred the application to wounds of all antiseptics except boric acid, which he held was a mild antiseptic and a mild astringent which did no harm. He treated wounds by washing them with saline solution or sterile water and applying boric acid to the granulations and *Unguentum Acidi Borici* to the adjacent skin, during a period when the use of frequent antiseptic dressings and the rigorous removal of all pus were accepted teaching. "Mr. Russell and his pepper-shaker of boric acid" became a subject for mild jesting, in spite of the fact that the method produced good results. Many of the fruits of Russell's originality are now procedures which enjoy wide acceptance, examples of which are Russell traction for fracture of the femur, cure of inguinal hernia by simple removal of the sac, and the use of the "walking plaster" (usually accredited to Böhler); and even Russell's old two-stage operation of "artificial hypospadias" with subsequent reconstruction is sometimes useful for the treatment of certain urethral strictures.

open ulcer into a crusted wound, which is left exposed to the air. Epithelialization proceeds under the crust, which eventually drops off, leaving a healed surface. The wound and surrounding skin are cleaned by gentle sponging with "Lysol" or "Dettol" and then swabbed with spirit. The excess is mopped with gauze and the whole is allowed to dry. Boric acid is then dusted on the wound surface and the wound is dried under a stream of hot air from an electric hair dryer. The wound then has much in common with a burn coagulated with tannic acid—in fact tannic acid can be used instead of boric acid. Any tendency to become moist is checked by a daily blast of hot air. The few wounds that will not dry up in this manner are treated with daily or less frequent dressings, or are closed with adhesive plaster and left alone for a few days. The boric acid and hot-air method can then be tried again. Dressings of dry gauze appreciably impede healing; also they tend to stick, and removal is painful. *Tulle gras* or similar preparations, which one can easily make, may be employed for surgical wounds which tend to discharge. The boric acid method, however, gives the best results. It causes the wound to shrink and heal with a sound scar, which is often much smaller than one would anticipate from the original size of the wound.

Difficulties in Treatment of War Wounds.

Some of the most troublesome cases are those of injury to the upper limb. Injuries to the fingers, hand and wrist are common, and are often caused by machine-gun fire against infantry firing rifles and against men using field glasses *et cetera*. Much of the difficulty in subsequent treatment is the result of well-meaning but inadvisable conservatism in the primary treatment of these wounds. Excision should be thorough, and every effort should be made to secure primary healing. A "through-and-through" wound of a finger with loss of substance of a metacarpal bone or phalanx is almost certain to be complicated by loss of both flexor and extensor tendons. In these cases, if primary healing is secured, the patient is left with a useless, stiff finger, which is an encumbrance. If the wound becomes infected, the function of the entire hand is jeopardized. On the average, better functional results are obtained if the affected finger, if necessary including the metacarpal head, is amputated with the same promptness with which the ophthalmic surgeon excises an eye when he fears sympathetic ophthalmia. One hesitates to sacrifice the thumb; but poor results follow prolonged convalescence in those cases in which there is an infected comminuted fracture. In cases in which there is little prospect of securing primary union with perfect function, the aim should be to excise the wound including the fractured portions of the bones, and to secure healing with ankylosis in a useful semi-flexed position. Infected wounds of the carpus may be treated in "closed plaster" in the optimum position should ankylosis follow, with the hope that stiffness will not be complete. The carpal bones may heal and coalesce. Some cases require excision of the carpus. Gunshot wounds of the forearm are often complicated by nerve injuries. The commonest is ulnar paralysis in association with compound fractures of the ulnar; but median and dorsal interosseous lesions are fairly common complications of fracture of the radius. Secondary hæmorrhages from the radial or ulnar arteries occasionally occur and should be watched for in infected fractures. Fractures of the humerus caused by bullets, high-explosive shells and bombs are often much comminuted, and the patients arrive with the bones in bad position. This appears to be due to the use of the Böhler abduction splint, which cannot always be given the attention it needs. Patients complain of discomfort with these splints. Cramer wire abduction splints are better and more comfortable; but the plaster spica gives the best results so far as immobility and comfort are concerned. My practice is to secure as good alignment as possible without undue manipulation in infected cases, and leave the limb in a plaster spica. Union, especially when multiple small fragments of metal are present, tends to be very slow. In some cases preliminary traction by means of the Böhler splint is resorted to in order to improve alignment, and a plaster spica is applied subsequently. I operate on damaged nerves as soon as possible after the wound has healed, especially when only the soft parts are injured—that is to say, within a few weeks. I find the danger of stirring up infection to be very small. It is absurd to wait for many months and operate when the muscles have degenerated. In many cases exploration is rewarded by the discovery of foreign bodies or spicules of bone impinging on, or actually transfixing, the nerve trunk. I have had some rapid cures in partial lesions by performing neurolysis and incising the nerve sheath. Some patients have had improved movements and freedom from pain in a few days, after several weeks of expectant treatment had resulted in no change.

Wounds of the lower limb have been far less troublesome. Conditions like foot drop and stiff joints, though common enough, are largely avoidable, as they are due to faulty technique. Patients with fractured femur have not been numerous, presumably on account of the high immediate mortality, and most of those we received arrived in good condition, having been well managed; many of them have been discharged to duty, cured. Wounds of the soft parts of the thigh are seldom troublesome, though one convalescent patient developed a sudden fulminating, fatal gas gangrene of the entire leg a few days after the removal of a piece of metal from the *adductor magnus*. Men with injuries to the leg usually arrive with the bones in good position, and it is seldom necessary to do more than correct minor defects of alignment. The majority have their limbs encased in plaster and are made at once ambulant by the fitting of walking irons. Men with gunshot injuries to the foot tend to develop trouble from sepsis of the bones and the tarsal joints. Ambulant treatment in plaster casts ultimately results in healing possibly with synostosis of the tarsal bones. In contrast with wounds of the hand, surprisingly good functional results have been obtained even with gross bony defects.

One aircraftsman had a large wound across the sole, which resulted in the loss of large pieces from all the metatarsals except the first. There were numerous small pieces of metal in the tissues; yet the wound healed quickly and the man walked without discomfort and practically no limp and went back to duty.

Some very severe wounds are caused by projectiles from antitank guns and aeroplane cannon. Very troublesome wounds are those caused by the small hand grenade. These fill the tissues with small fragments of metal resembling cut-up wire. They do not penetrate deeply and the wounds heal readily; but the part remains painful and the residual disability is considerable. Treatment is a problem, since the foreign bodies are numerous, and the only feasible procedure seems to be to leave them alone and wait, in the hope of being able to remove those that appear to give the most trouble.

With regard to bullets and pieces of shell, bomb *et cetera*, our practice, generally speaking, is to leave alone small ones that are causing no trouble. Large ones likely to give trouble or actually giving it are removed as promptly as conditions warrant; only those in inaccessible situations are left. It is found that most large retained foreign bodies sooner or later do give trouble, and those which are near the surface irritate the patient, who usually demands their removal. When irregular pieces of shell and bomb are removed, it is often astonishing to observe how much gross dirt is enmeshed within their claw-shaped processes, and yet the wound has remained healed.

Wounds of special regions such as the skull, eye, jaws, thorax and abdomen, though quite common, are outside the scope of this article, which is primarily concerned with ordinary wound treatment.

The guillotine amputation still appears to be widely practised. These stumps take a long time to heal, because often the blood supply is poor and they are apt to develop a ring of fibrous tissue, which further impedes the vascularity of the granulating surface. Grafts do not take well. Convalescence is prolonged. Reamputation before healing is complete is not devoid of danger. If flaps of some sort could be devised at the time of operation, and if necessary closed by secondary suture, secondary amputation in order to make the stump conform to the require-

ments of the artificial limb maker could be undertaken earlier, with the saving of much avoidable anxiety and discomfort to the patient and many weeks in hospital. It is improbable that the fashioning of simple equal flaps or a circular amputation would appreciably aggravate the shock of operation. Contact of a large raw surface with the dressings quite possibly contributes just as much shocking effect. The guillotine amputation may at times be imperative; but it is questionable whether it is ever correct to describe it as a "method of choice".

Rehabilitation.

The vast majority of patients with war wounds have full movements, or at the most only slight disability, when the plaster cast is removed. This follows the constant encouragement of movements of those parts not immobilized, such as the fingers, elbows, shoulders, toes and knee. The muscles that cannot move evidently undergo isometric contraction and retain their tone. In fractures of the forearm it is often necessary to fix the elbow; but as union progresses a shorter cast can be employed in the later stages. A similar procedure can be adopted in the case of fractures of the leg, unless they are too near the knee. Some stiffness following fractures into joints and infected open fractures, especially those close to joints, may be unavoidable. These lesions generally respond well to graduated exercises. Weak muscles can be given assistance by means of a smooth, powdered board used as an inclined plane, or by means of a counterpoise in the case of muscles like the deltoid, and this can be improvised from a bottle of water fixed to string and pulley. A cycle exerciser is useful to restore movements and muscle tone in the legs. Passive movements are strictly forbidden, since they always do harm in the early stages and do no good in any case. Any necessary deliberate manipulations should be carried out by the surgeon himself. I have seen recovery delayed by unauthorized passive movement. Massage is seldom indicated except in cases of swelling and œdema of a non-inflammatory nature. Patients gladly do light duties, using their injured limbs when they are told that their recovery will thereby be hastened. Those who are in a "walking plaster" are forced to walk if their meals are arranged in a central dining room. Patients with divided or injured motor nerves are treated on much the same lines with the addition of postural exercises, hydrotherapy and small doses of diathermy to maintain circulation. Electrical stimulation of paralysed muscles is futile. W. Rowley Bristow (1941) advocates it as a psychotherapeutic measure, but admits that it has no effect on the regeneration of the nerve. The stimulation of paralysed muscles by electricity is not physiological, and is unsound. Clinically it appears to aggravate degeneration.

The methods I have employed are described to show that good results can be obtained with a minimum of physiotherapeutic apparatus and staff, though I am aware that there is scope for improvement in the direction of establishing properly organized physical and occupational therapy clinics. This is under consideration. At present almost the entire responsibility falls on the surgeon.

Factors which Influence Wound Healing.

The management of a wound is not necessarily exclusively the local treatment of the wound itself. Control of infection is, of course, the principal factor, since healing is expected within ten days or so after even the most drastic deliberate surgical operations when healthy tissues are divided cleanly. It is probable that some degree of infection is present in every wound, not excluding those which heal by "first intention". The importance of subinfection or masked infection—that is to say, infection that is not recognizable clinically—has been pointed out by Leriche (1939), and no doubt this is responsible for such unexpected complications as delayed healing, hypertrophic scars, keloids, wound dehiscence, subsequent abscesses about the original wound *et cetera*. Foreign bodies, apart from their power of conveying infective material into the depths of the wound, delay healing and aggravate infection because of their irritating properties, which may be mechanical, chemical or possibly electrical. Infected wounds can and do heal, and compound fractures can and do unite, in the presence of metallic foreign bodies and sequestra. Their removal is always desirable, though not always absolutely imperative; in fact, cases are frequent in which they are so numerous that removal of all of them would be impracticable. Immobilization is of the utmost importance. This is evident on clinical grounds alone, though Trueta has brought forward theoretical considerations to endorse the soundness of this procedure. Disturbances of the normal tension of the tissues evidently produces interference with local circulation of blood and lymph and possibly intracellular disturbance as well. The slight pressure and prevention of unlimited swelling under a closed plaster cast is probably parallel to the healing of a varicose ulcer under the influence of light pressure. The necessity for adequate drainage is a surgical axiom, and failure to secure it by proper opening up and exploration of wounds is one of the common causes of trouble with the "closed plaster" method. Maceration of the skin, which is always potentially infected, favours the growth of organisms. Böhler (1935) and Watson-Jones (1941) favour exposure to air of recently sutured wounds, and the prevention of maceration by the "boric acid, hot air, no dressing" technique accelerates the healing of wounds in which healing is already advanced. In fact, it is possible to make a recently healed wound break down again by applying wet compresses or a plaster cast.

The healing of wounds depends in addition upon factors other than local ones. It is well known that the tissues of elderly patients heal less kindly than those of the young and robust. Constitutional diseases, such as diabetes, chronic nephritis, cardio-vascular insufficiency and syphilis, are well known enemies of ready healing. Not only is anæmia prejudicial to rapid healing, but as Devine (1940) points out, reparative processes may not take place normally in patients who have repeatedly had hæmorrhage and been given blood transfusions. Water imbalance and loss of chlorides are held by Allen (1939) to affect healing adversely; to these factors he adds low protein level in the blood. The former two conditions can be combated by clysis or the intravenous administration of solutions, while the last-mentioned conditions can be dealt with by suitable feeding or by blood transfusion. The question of the influence of vitamin *C* on healing has recently engaged attention (Converse and others, 1941), and it appears that a low level of ascorbic acid in the blood, which can be determined by laboratory methods, materially impedes healing. Allen suggests that other vitamins, especially nicotinic acid, may also be of importance in wound healing.

Summary.

1. Early radical excision of war wounds gives the most promise of rapid recovery and of minimum interference with subsequent function.

2. The various antibacterial agents at our disposal, not excluding the sulphonamide group, are of use when suitably employed; but they must be regarded as adjuvants only. Chemotherapy is of some value in the prevention of wound infection.

3. The "closed plaster" method of wound treatment as the basis of treatment of all infected or potentially infected wounds of the limbs not only gives highly satisfactory results but is labour saving and inexpensive. It is agreeable to the patient and is ideal for transport of wounded. The method must be employed intelligently and the best results are secured when the practice closly follows the original Winnett Orr technique.

4. When wounds are, or become, superficial, rapid healing follows the production of a protective crust by means of boric acid powder and hot air.

5. Direct contact of cloth dressings impedes healing.

6. Some of the difficulties encountered in wound treatment are discussed.

7. Elaborate physiotherapeutic apparatus as an aid to final restoration of complete function is not absolutely indispensable.

8. Some general aspects of wound repair are discussed.

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VISCERAL NEUROSES.[1]

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Sydney.

AFTER receiving an invitation to address the North-Eastern Medical Association, I decided that a discussion of the visceral neuroses would be a suitable subject for my first lecture. The reasons that prompted my choice were: first, that these disorders are frequently found in general practice; secondly, that although they are often regarded as not being of much moment by the doctor, they are capable of causing much mental and physical distress to their victims; and lastly, because it would seem likely that in these times of stress and strain an increasing number of people would be affected by these disorders. Their recognition is usually comparatively easy, but sometimes their differentiation from disorders due to structural disease may be most difficult. To regard them as indicative of organic disease may condemn the patient to a life of unnecessary invalidism or to the hazards of unjustifiable operative interference.

The Nature, Ætiology and Pathogenesis of Visceral Neuroses.

Visceral neuroses may be held to include those disorders of visceral motility and sensibility not caused by organic disease.

The influence of the emotions upon those bodily functions which are controlled by the vegetative nervous system, and whose workings proceed without the conscious mind, is well known—for example, vomiting and diarrhœa arising from anxiety and the blanching resulting from fear. This influence may be produced either by the direct action of the autonomic nervous system or indirectly by its effects on the glands of internal secretion, such as the adrenals.

Neuroses in general may be conveniently divided into those disorders in which the symptoms are chiefly those of disturbed states of mind (the psychoneuroses, in which morbid fears, anxieties, depressions *et cetera* predominate), and those in which the chief symptoms are due to disturbances affecting one or more of the internal organs (the so-called visceral neuroses). In the first case the victim may have, for example, a distressing fear of heart disease without any actual symptoms referable to that organ. In the second there may be obvious symptoms and signs of disturbance of cardiac function, with for a time no conscious apprehension or fear. When, however, the disorder has existed for some time, it is usual to find both types of symptoms present. Thus a vicious circle is created, as the advent of each cardiac symptom increases the patient's mental agitation, which in turn exaggerates the liability to cardiac symptoms. In the so-called neurotic subject the response of the vegetative nervous system to psychogenic stimuli that would cause at most a trivial and transient disturbance in the normal person, seems to be grossly exaggerated in both its severity and duration. Such excessive reactions have been ascribed to a hypersensitive autonomic nervous system; but it would appear more reasonable to attribute them to excessive and unduly protracted psychic stimuli. It must be admitted, however, that such a psychic origin is sometimes so obscure as to defy the most careful investigation. It is well known that neurotic patients suppress and conceal their unreasonable fears and anxieties even when these are still present in the conscious mind; but in many cases the origin may be found in some long past experience which has disappeared from the conscious mind and has sunk into the autonomic zone, where it remains only as an "organ neurosis".

A careful search will usually reveal some evidence of instability of the nervous system, such as exaggerated introspection, increased suggestibility and morbid anxiety about health. There may be a history of previous nervous breakdowns during periods of stress. It is well known that these visceral disturbances affect persons of a certain type and temperament. They are generally alert, restless or highly strung. Frequently we find that visceral neuroses occur in more than one member of a family, and the same subject may suffer from more than one visceral neurosis either at the same or at different times.

Mode of Initiation and Perpetuation of Visceral Neuroses.

In the susceptible subject a visceral neurosis may be precipitated by fatigue, by emotional upsets or by worry. Frequently such a condition will arise during convalescence from some acute illness, such as influenza. The general state of physical tension accompanying chronic anxiety prepares the way for many of these neuroses. The anxiety of mind and the physical fatigue and irritability created by the symptoms themselves, uncertainty as to their meaning and apprehension of their recurrence, play an important part in the perpetuation of these disturbances. Like the conditioned reflexes of Pavlov's dogs given an effective initial stimulus, the susceptibility of the patient is constantly increased by repetition. Conversely, in treatment, anything which serves to lengthen the interval between the "attacks" or to eliminate one or more of the conditioning stimuli is calculated to reduce susceptibility.

Thus it is evident that in these cases of visceral disturbance it is of paramount importance to obtain a full history, not only of the patient's present illness, but also of his previous health and of that of his family. Careful analysis of the symptoms is essential and a thorough physical examination a *sine qua non*. Ancillary methods of investigation—for example, radiological, biochemical, electrocardiographic *et cetera*—must be used in certain cases; but undue concentration on these methods to the detriment of clinical history taking and symptom analysis must be avoided.

In this paper it is proposed to discuss some of the neuroses affecting the alimentary tract and the circulatory system.

Neuroses Affecting the Alimentary Tract.

Œsophageal Neuroses.

The well-known "*globus hystericus*" does not require much elaboration, nor does the so-called "heartburn". Most people have had experience of the "globus" as a feeling of a lump in the throat in times of grief, and of heartburn (sometimes through hurry in eating and indiscretion in diet, or perhaps through no ascertainable cause) as an unpleasant burning felt behind the sternum. It has been suggested that the "globus" is probably due to a local tonic ring contraction of slight degree, and heartburn to increased peristaltic action of the œsophagus.

[1] A post-graduate lecture delivered at Lismore on August 2, 1941.

Occasionally œsophageal neuroses may simulate organic disease. In these spasm may give rise to pain, difficulty in swallowing and regurgitation of food. These neuroses have to be distinguished from benign and malignant stricture, achalasia of the cardia, reflex spasm from neoplasm at the cardiac end of the stomach and the dysphagia associated with anæmia and glossitis characteristic of the Plummer-Vinson syndrome. While radiology and œsophagoscopy have facilitated the differentiation of the functional from the organic, there are usually certain distinguishing features in the clinical history. The neuroses are characterized by intermittency and by association with nervous causes and with the neurotic temperament. The continued and progressively increasing pain and dysphagia, first with solids and later with liquids, found in carcinomatous infiltration, and the food retention and regurgitation of achalasia are not characteristic of the neuroses.

Gastric Neuroses.

Gastric neuroses are numerous and are frequently encountered in practice. They may be manifested by epigastric pain or discomfort, nausea or vomiting, flatulence or anorexia in varying combinations. Those which simulate organic disease, such as gastric or duodenal ulcer, are the most important, in that inappropriate methods of treatment may be deemed necessary and invalidism may be increased by the idea of some graver trouble. Although operations are far less frequently performed for the gastric than for the colonic neuroses, there has been too long a tally of them in the past. Genuine allergic dyspepsia is said to be rare by such an authority as J. A. Ryle, and it may be associated with food poisoning or food idiosyncrasy and urticaria or angioneurotic œdema.

It is of interest to note that Payne and Newman, in an interim report on dyspepsia in the British Army, found that less than 4% of the subjects were suffering from functional dyspepsia. Colonel H. Letheby Tidy, in opening a later discussion on the same subject, was of the opinion that some psychological factor might be at work in aggravating the large number of patients with gastritis whom he had found in the army. Sir Arthur Hurst, in the same discussion, condemned the frequent admission to hospital of soldiers with functional dyspepsia, and drew attention to the risk of a new syndrome—disordered action of the stomach ("D.A.S.").

Colonic Neuroses.

The condition known as spastic colon is characterized by discomfort or pain usually in the lower part of the abdomen. The discomfort is variously described as a feeling of stagnation or "stoppage" or as a "ball" or a "lump". The pain is usually a dull, continuous ache, and is frequently referred with accuracy to the part of the colon involved. The pain may be severe enough to interfere with work, but sleep is seldom lost on account of it. The colon can often be palpated in its tonic contracted state.

Examination of the stools as a rule reveals nothing very characteristic, excepting in the case of those patients suffering from muco-membranous colic; they pass large masses of coagulated mucus, sometimes in casts or shreds or enveloping small scybalous masses. Sometimes fragmentation may be present, and in the presence of anal spasm narrowing of the fæcal mass.

Sigmoidoscopy is often most difficult and painful on account of the spastic narrowing of the rectal and sigmoid portions; this is further stimulated by the passage of the instrument. The appearance of the mucosa is perfectly healthy.

Less is gleaned from the X-ray examination than might be supposed, because the barium enema may by its gradual introduction and gentle distension overcome existing spasm. Examination after a barium meal is more likely to give positive evidence, and in extreme cases the affected length of bowel appears as a thin thread or streak of barium.

The following conditions have to be distinguished from the spastic colon: appendicitis, duodenal ulcer, diverticulitis, carcinoma of the colon, renal colic, intestinal obstruction, ovarian or tubal disease, hypochondriasis and ulcerative colitis. Colonic carcinoma has frequently been feared in cases of spastic colon, because the patient himself or his physician has discovered a hard lump in the course of the colon. The smoothness of the tumour, its sausage-like shape, its mobility, its variations in size and hardness and its complete disappearance under observation are important points in differentiation. The absence of obstructive symptoms and of the passage of blood and a very long history of abdominal discomforts are reassuring features.

Spastic colon is frequently associated with bronchial asthma, another spasmodic condition in which psychic stimuli play an important part. Female sufferers from spastic colon sometimes have frequency of micturition and bladder pain; these may be regarded as manifestations of irritability of plain muscle.

A condition in which there is a sensation of something to be evacuated from the rectum although it is empty has been described as rectal globus (on the analogy of œsophageal globus). Intense neuralgic pain in the rectum, which may last for five to twenty minutes, has been noted in this condition. The pain may give rise to the impression that the coccyx is being bent forward and is sometimes so severe as to cause fainting. It is probably due to intense spasm of the powerful local sphincters. Overwork and worry may be precipitating factors and inflation of the rectum with air may bring relief. Such spasms must be differentiated from the rectal crises of *tabes dorsalis*.

The Nature of Neuroses Affecting the Alimentary Tract.

From the foregoing observations it will be apparent that in neuroses affecting the alimentary tract there is a loss of neuromuscular rhythm due probably to a failure of balance between the parasympathetic and sympathetic nerve fibres.

Cardiac Neuroses.

The cardiac neuroses are a most important group of visceral neuroses, because psychic reaction resulting from doubt concerning the integrity of the heart appears to be much more violent and profound than is the case with any of the other internal organs. In the lay mind the thought of heart disease is still associated with sudden and unforeseen death. Much harm has been done in the past by doctors who labelled functional heart disorder as cardiac disease.

As in the case of the neuroses affecting the alimentary tract, the origin of a cardiac neurosis may be found in some psychic stimulus, such as the occurrence of some dramatic case of heart disease, perhaps with sudden death, among the relatives or friends of the patient. The disorder may develop after some profound emotional disturbance, and its manifestations may first arise in the form of palpitation during convalescence from some acute illness or after the excessive use of tobacco.

The symptoms should be subjected to careful analysis in order to differentiate organic disease. The chief complaints may be placed under the headings of pain, palpitation and breathlessness. The pain may be so severe as to suggest true angina, or there may be only a feeling of fullness or pressure in the left hypochondrium. Only rarely is the pain referred directly to the retrosternal region. Usually its location is near the cardiac apex or over the left half of the precordium. Frequently the pain is transient, and the steady constricting character of anginal pain is lacking. There is seldom any very close relationship between the pain and physical effort; indeed, the pain is more apt to be experienced when the patient is at rest. Although the pain found in the neuroses is in the majority of cases easily distinguishable from that seen in serious organic disease, it is not always so, and the character of the pain cannot of itself be always relied upon to make the differential diagnosis between a neurosis and disease of the coronary vessels.

Palpitation usually manifests itself as a feeling of fluttering in the precordium or as a sensation of pounding

in the ears of the temples or as an unpleasant sensation resulting from the single thump which follows a premature beat. Occasionally, however, the complaint is of a sensation as though the heart were not beating.

Breathlessness is frequently complained of by people suffering from cardiac neuroses; but it differs from the dyspnœa found in organic disease, in that it usually does not become progressively more severe. Sometimes the patient may complain of inability to take a satisfactory breath.

On examination, tachycardia in response to emotional changes is frequently noted, although sometimes the heart's action may be abnormally slow. With the tachycardia there is usually violent throbbing of the precordium, such as occurs as a normal response to fright or anger. Premature ventricular beats are frequently noted and evidences of vasomotor instability are present in most patients in the form of rapid flushing in response to even slight emotional changes. Tenderness on palpation is often present at or near the apex beat. The foregoing clinical phenomena constitute the condition variously named neuro-circulatory asthenia, the effort syndrome, da Costa's syndrome, the irritable heart of soldiers, or "D.A.H.". Probably the best descriptive term is neuro-circulatory asthenia. The designation "effort syndrome" was introduced by Sir Thomas Lewis because of the resemblance of many of the phenomena to the effects of severe effort. It should be noted that the condition is found not only in soldiers, but also in young people of both sexes, during times of peace. A majority of the patients bear stigmata of constitutional inferiority, either nervous or physical. Among the exciting causes much the most important appears to be prolonged and severe nervous strain, especially if it is associated, as it often is during times of war, with fatigue and physical exertion. In many instances the symptoms first appear during convalescence from an acute illness.

It should be remembered that the syndrome termed neuro-circulatory asthenia may often be found in patients suffering from organic heart disease; but usually when structural changes are causing severe or distressing effects the neurotic symptoms, if present at all, are apt to be relatively unimportant. It is in the milder forms of heart disease with few symptoms that the emotional reactions tend to occupy the foreground of the picture and to demand serious consideration. On their proper assessment by the physician may rest the whole structure of successful treatment. The association of organic disease with symptoms of a purely neurotic type is found in patients of all ages—for example, in older children with rheumatic heart disease who have been forbidden by an over-anxious mother to avoid all physical effort, in neurotic women with mild degrees of mitral stenosis, and in middle-aged persons who are oppressed by the thought that they suffer from high blood pressure.

In differential diagnosis the chief difficulty lies in separating the neuroses from organic disease of the heart. Pulmonary tuberculosis and thyreotoxicosis may have to be considered in some instances. Pain in the left mammary region arising after a strenuous effort, such as lifting of a heavy weight, may be due to pectoral muscle sprain or to fibrositis of the chest wall. Patients suffering from these conditions frequently complain of symptoms suggestive of heart disease, but a careful evaluation of the history will usually enable the physician to reach the correct conclusion. The diagnosis of a neurosis should never be made merely on negative findings alone. While these are essential, they are only part of the evidence upon which the diagnosis should be based. In hardly any other condition is there greater need of dogmatism and certainty in diagnosis. Without confidence in himself the physician can hardly hope to instil into the mind of his patient that confidence which is the basis of all successful treatment.

Prognosis of the Visceral Neuroses.

The prognosis of the visceral neuroses depends upon the mental attitude, the degree of psychic upheaval and very largely upon the treatment received. If the patient is of reasonably stable mental composition, and if his anxiety is allayed by wise and tactful management, the visceral disturbances are in many cases immediately stripped of their significance and will usually disappear soon. If the nature of his symptoms is misunderstood and he is treated as though he had some organic weakness, the symptoms tend to become pronounced and fixed. On the other hand, even skilful management of an apprehensive patient with a history of psychoneurotic disturbances may do no more than cause a temporary subsidence of the anxiety neurosis. In the case of the cardiac neuroses he may from time to time have sudden attacks of unreasonable fear and panic in the absence of definite cardiac symptoms.

The visceral neuroses are frequently found in association with organic disease. Whether the psychic stimulus which apparently activates a visceral neurosis will cause organic disease is an interesting problem. In this connexion the suggestion of Houston that essential hypertension may result from frequent spasmodic stimuli acting upon the arterioles as a result of the mode of life adopted by civilized communities is of great interest. The experimental production of peptic ulcer by hypothalamic stimulation is also suggestive.

Treatment.

Prophylaxis.

In many cases the problem of prophylaxis is simple, and a tactful explanation and reassurance are all that is required. Prophylaxis of further attacks is of major importance. The fundamental difficulty for a patient with a visceral neurosis lies in his personality and mental composition. Although it can hardly be hoped to alter materially these ingrained characteristics, the medical attendant should avoid making "any suggestion that may serve to crystallize his fluid anxieties" (Conner). Minor visceral disturbances should not be emphasized. Anxious parents of children with the milder form of heart disease should be cautioned concerning too frequent reminders to the child that he is not as other children. As Conner puts it, "such an attitude may well lead to psychic scars more serious and disabling than those of the heart valves".

Curative Treatment.

The treatment of the visceral neuroses is the treatment of the individual patient. The first step is to acquaint the patient with the fact that his symptoms are due to emotional causes rather than to organic disease. Such knowledge may bring great relief to some patients; but the reaction of many to this disclosure is one of strong resentment. Such a reaction must be prevented at all costs, because the patient's true understanding of his complaint must not be obtained at the expense of his self-respect. If the necessary time and trouble are taken, it is usually not difficult to convince the patient that his symptoms are no less real and disturbing because they are brought about by agencies outside the particular viscus affected, the really important difference being only that in his case the symptoms are curable, whereas if they were due to organic disease they might not be. Such a discussion should of course be preceded by a complete clinical investigation, supplemented if necessary by various special examinations.

If the patient can be persuaded to accept without resentment the idea that his symptoms are of "nervous" origin, the battle is half won. From then on reassurance and encouragement will complete the treatment. But these methods will not succeed in a large number of cases, because the visceral neuroses affect persons and families endowed with the neurotic temperament in greater or less degree. Fatigue, physical and mental, should be avoided.

In the case of the neuroses affecting the alimentary canal, antispasmodics, such as belladonna, may be useful in some cases. The sedatives, such as bromides and phenobarbital, also play their part.

With regard to the cardiac neuroses, the patient must be encouraged to take exercise, and he must be shown that exercise makes his symptoms better, not worse. This

will serve the double purpose of demonstrating to the patient that his heart is capable of much more than he supposed and of rendering it less ready to respond to psychic stimuli. The form of exercise will depend upon the requirements of the individual patient. Generally speaking, outdoor sports, such as golf or even tennis, which combine recreation with muscular exercise, will be of assistance. Walking is an excellent exercise. For some patients indoor exercise in a gymnasium is the only form available; but whatever type of exercise is undertaken, it should be taken persistently and regularly, and graduated to suit the requirements of the patient.

At the outset it may be necessary to use phenobarbital and bromides. Digitalis should be avoided, because no intelligent patient can possibly be persuaded that his heart is normal when at the same time he is asked to take digitalis.

Excessive use of alcohol, tobacco and coffee should be avoided.

The treatment should be the treatment of the individual. By the means outlined above, and by the avoidance of concentration on what Ryle has termed the "stammering organ", are we "most likely to do service to patients whose sufferings are always inconvenient and sometimes as real and disabling as those caused by structural disease". The practitioner may in some cases be rewarded by brilliant results equal to anything achieved in medicine; but there are a large number of patients who fail to benefit by any treatment and who, in the words of the immortal William Osler, "would have to be rebuilt from the blastoderm".

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PARALYTIC SQUINT.

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TRANSITORY paresis of the lateral rectus muscle due to loss of function of the sixth (or abducens) nerve is not uncommon in adult life. This nerve winds its long and solitary course in a somewhat exposed position. A little below the upper border of the petrous portion of the temporal bone it pierces the *dura mater*, passes beneath the petro-sphenoidal ligament at the side of the *dorsum sellæ* and enters the cavernous sinus, in which it runs forward along the outer side of the internal carotid artery. At the anterior end of the sinus it passes through the sphenoidal fissure into the orbit, and ends in the lateral rectus muscle. Some fibres of the nucleus, however, do not join the sixth nerve, but cross over in the posterior longitudinal fasciculus and join the third nerve of the opposite side, by which they are conveyed to the medial rectus of that side. In this manner impulses from the sixth nerve nucleus throw into simultaneous action the lateral rectus of the same side and the medial rectus of the opposite side, and turn both eyes in the same direction. So much for the anatomical aspect.

This exposed position of the sixth nerve, especially that part adjacent to the petrous bone, makes it more liable to contiguous infective and other influences, and to trauma, than the third nerve, which runs a deeper course. The transitory paresis to which I have referred usually recovers in from one to three months on the exhibition of salicylate of soda, followed by iodide of potassium and *nux vomica*. I have always regarded it as "rheumatic", whatever that term connotes. I assume a toxæmia of some sort. I think it is never luetic, whereas a sudden third nerve palsy is invariably so, and is permanent. Diphtheria must always be kept in mind where a sudden convergent squint occurs in a child; this will recover.

FIGURE I.
Before operation.

Rarely, however, one meets with what is apparently a congenital paralysis of the abducens nerve, with a convergent squint, and with secondary contracture of the medial rectus. This is possibly, even probably, due to a

FIGURE II.
After operation, looking forward.

birth trauma, perhaps a hæmorrhage in the meninges in the mastoid region. I have operated successfully in four such cases and in two of acquired paralysis. The operation I have described in detail elsewhere.[1] It consists of pedicle-grafting of slips from the superior and inferior rectus tendons to be attached to the insertion of the lateral

rectus, with appropriate attention to the contractured medial rectus. Complete abduction is not obtained, but all squint in the primary position is abolished, and the eye can be abducted from 20° to 30°. Some American surgeons have suggested the taking of the slips from the mesial aspect of the vertical tendons instead of the lateral aspect, but I cannot too strongly condemn this method. If it is used, so much abductive power is obtained that all adduction is abolished, and a further operation has to be performed to remedy this state of affairs. When the slips are being detached from the tendons, they should not be split off too high towards the muscle's origin, as thereby their pull is lessened. I feel satisfied that the result obtained is largely a mechanical one and is only in slight measure physiological. This is well brought out in a paper by H. St. Vincent Welch.[2]

Report of a Case.

A recent case was met with at the Ryde Hospital.

A child, aged six years, was knocked down by a motor car and sustained a fractured skull, with bleeding from the right ear. On recovery she had complete paralysis of the sixth nerve, with a pronounced convergent squint of over 40°. After five months no repair had taken place, so I operated on January 27, 1942. As probably no hypertrophy of the medial rectus had occurred in so short a time, I contented myself with a zig-zag lengthening of this tendon to relax it. A slip from the lateral aspect of each vertical tendon was used. The result was excellent. Figure I shows the appearance of the eyes in the primary position before operation, though it is no credit to my photography. The snapshot showing the loss of abduction on looking to the right did not come out at all; but the loss was complete. The child now has no squint in the primary position (Figure II) and from 25° to 30° of abduction on looking to the right (Figure III).

FIGURE III.
After operation, looking to the right.

Comment.

The operation is an easy one, taking no more than twenty minutes. Fine buried silk sutures are used. No patient with squint due to paralysis of the abducens nerve, whether congenital or acquired, should be condemned to a lifelong deformity, as cure by operation can be promised with confidence.

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EXPERIMENTS ON THE IMPROVEMENT OF THE TREATMENT OF MUSTARD GAS LESIONS OF THE SKIN.

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OF the 36,965 gas casualties in the American Army in the Great War, 27,711 were caused by mustard gas ("Yperite", "yellow cross"). Of the 160,970 gas casualties in the British Expeditionary Force, approximately 80% were in the same category.

Although the use of poisonous gases has not so far played any important part in the present war, there can be no doubt that in the case of an extensive use of gas the vesicant gases would play a dominant role. Mustard gas is the most important representative of this group. When pure, it is a heavy, oily, colourless liquid; the brown discoloration and mustard or garlic-like odour are found only in the impure samples obtained by the ordinary methods of manufacture. Its vapour tension is negligible at low temperatures, but is considerable at high temperatures, so that to leave contaminated objects in hot rooms is dangerous. It is insoluble or very sparingly soluble in water, easily soluble in acetone, alcohol, ether, chloroform, benzene, nitrobenzene, liquid paraffin, petrol and rubber. Contact with water decomposes it hydrolytically. With hypochlorites it forms non-toxic sulphoxides.[1]

In order to secure its decomposition and detoxication in the human skin, bleaching powder (calcium hypochlorite) is applied either in pure powder form or incorporated in ointment (anti-gas number 1), paste or petroleum jelly.

Action on the Skin of Man and Rabbits.

The more delicate and the less pigmented the skin, the greater is its sensitivity. Especially susceptible are the eyelids, the genitalia, the inguinal region and the anus. As a rule, solutions of a strength of 1% and upwards are harmful to most individuals of the white races.[2] Even in a subject (F.G.) with good pigment-forming capacity, painting the skin of the thighs with a 1% solution regularly gives an erythema at the site of contact within six to ten hours. The erythema may disappear from man and animals in about forty-eight hours or may undergo a further development. Premonitory symptoms, such as burning and itching, may be absent. In the present investigation the skin of the ears of rabbits was found to exhibit individual variations. While many animals were resistant to painting with a 1 in 200 solution, others showed a reaction after latent periods of a few hours to several days. A concentration of 1 in 80 to 1 in 50 regularly produced blisters. These did not appear before a period of twenty-four hours—usually later. The contents of a well-filled blister are clear; a single outcrop of blisters was reminiscent of *miliaria crystallina*. The blisters appear to be painful and, if left to themselves, burst on the third or fourth day, with the formation of superficial erosions or deeper ulcers. Firmly adherent, yellow, impetigo-like crusts develop in due course. Further progress is slow and generally lasts for weeks, until a healthy granulation with vascular tissue appears. After four to six weeks the lesions generally heal and a superficial scar with telangiectases and irregular pigmentation is the result. This stage reminds one vividly of a chronic radio-dermatitis.

Deeper lesions lead to perforation of the ears of the animals. The defect is not filled up; the margin of the perforation heals and a clear-cut, rectangular area from which tissue is lost is evidence of the entire destruction of all layers. The skin reactions that go no further than erythema formation are characterized by a pronounced purple discoloration, which persists for a short period and is replaced by a pronounced brownish or coppery pigmentation, accompanied by superficial peeling. It is of interest to note that the contents of the vesicles do not produce irritant reactions either in the same individual or in control animals.

Treatment of Skin Lesions.

The usual routine treatment is the cleansing and drying of the skin and the application of bleach. Calcium hypochlorite is quite suitable for the decontamination of inanimate objects and places. Unfortunately the application of this compound to the skin has many disadvantages, including the frequent production of severe dermatitis. The inflammatory lesions that follow its application are themselves unpleasant complications of the dangerous and painful mustard gas lesions. In order to minimize the risk, the early removal of bleach preparations and fresh cleansing of the skin are recommended. The necessity for this procedure is one of the disadvantages of the treatment, which must usually be applied quickly and under unfavourable conditions.

In order to avoid the above-mentioned difficulties the application of chloramine is recommended. Chloramine-T is the sodium salt of *p*-toluene N-chloro sulphonamide. It is applied either in the form of an ointment (anti-gas number 2) or in solution. The introduction of chloramine to replace the strongly irritating bleach must be considered an advance, although this agent, when used in higher concentrations, does irritate the skin. For the mucous membrane a concentration of 0·1% or 0·2% is sufficient. Chloramine forms a non-toxic compound with the "gas". Oxidation effects play only a secondary role in this connexion.

One of the most dangerous properties of mustard gas is its great power of penetration. What happens in tissues and cells attacked by this substance is still imperfectly understood. When hydrolysis takes place, the generation of hydrochloric acid in tissues is possibly responsible for much of the damage and for the pronounced diminution of resistance against secondary infection.

From my observations I conclude that either the reaction requires a certain time to develop or it is reversible in its initial stages. If so, a clearly defined therapy should aim not only at the neutralization of gas residues adherent to the surface of the body, but also at the destruction of that part of the gas which has already penetrated.

Attempts to obtain substances which would increase the penetrability of various active agents applied to the skin have been made for a long time. Different keratolytic compounds, such as salicylic acid, resorcinol, alcoholic camphor solution and others have been tried.

A number of promising reports have appeared, especially in American literature, concerning the effects of a number of sulphonated oils, higher alcohols and their esters. These are used in cosmetics as synthetic soaps and emulsifying agents, and in industry as "wetting agents". A "wetting agent" is defined as a substance which, by means of its effect in lowering the interfacial tension, increases the penetration of the skin and acts as a detergent or emulsifying agent. As a group the esters of sodium sulphosuccinates have been found to be the most powerful wetting agents yet described.

It occurred to me that this property might be made use of in the treatment of gas lesions of the skin. The combination of active gas-destroying agents with neutral yet physically active substances appeared to have distinct possibilities. It seemed to me that by means of better wetting of the affected surface and by considerable strengthening of the penetrative powers of the chloramine medium better results might be obtained. A publication in the *Archives of Dermatology*[3] and also personal discussions with Dr. E. Cohen in Melbourne directed my attention to "Aerosol".

"Aerosol O.T. dry 100%", product of the Carbon and Carbide Company, is the di-octyl ester of sodium sulphosuccinate. It forms a clear, soluble colloid with water in a concentration of 1%. Glycerin and sugar promote its solubility. In higher concentration it forms a slimy gel. It is used in the cosmetic industry in the preparation of viscous lotions, creams, shampoos *et cetera*. It is absolutely neutral and stable, and is a wetting agent of the highest surface activity. It lowers the surface tension of water from 72 to 26. It is fairly soluble in a great number of organic solvents. Its disadvantages are its manufacture outside Australia and its high price.

Experimental Observations.

For experiments the following prescriptions were used: (i) 0·2% aqueous solution of chloramine; (ii) 10% aqueous solution of "Aerosol"; (iii) 10% oily solution of "Aerosol"; (iv) Lanolin and "Vaseline" ointment; (v) 2% chloramine in lanolin and "Vaseline" ointment; (vi) 0·5% chloramine in lanolin and "Vaseline" ointment; (vii) 0·2% chloramine and 8% "Aerosol" ointment of the following type: chloramine-T 0·04 gramme, aqueous 20% solution of "Aerosol" 8·0 cubic centimetres, anhydrous wool fat 8·0 grammes, "White Vaseline" 4·0 grammes.

The ears of rabbits were chosen as the most suitable place for experimental purposes. Only a few experiments were made on the human skin—for example, on the anterior surface of a leg of a man of dark complexion.

Results.

The application of a 0·2% solution of chloramine to the affected skin absolutely prevented any cutaneous reaction when used not later than three or four minutes after contact with mustard gas.

The 10% aqueous solution of "Aerosol" had no effect on the course of the reaction when applied immediately after contact with the gas.

The 10% oily "Aerosol" preparation, when used immediately, greatly weakened the cutaneous reaction.

Lanolin and "Vaseline" ointment alone was found to be ineffective.

Chloramine (2%) in lanolin and "Vaseline" neutralized the usual irritating action of the gas in six cases when applied approximately fifteen minutes after exposure to the gas. The ointment failed in four cases. In one case the result was indefinite; in one ear the reaction was diminished, while in the other it was unchanged. The application of the ointment as late as thirty minutes after exposure gave unsatisfactory results in eleven experiments. The 2% chloramine ointment is not especially suitable for mass treatment, since both in man and in animals it produced irritation or dermatitis in a number of instances.

Chloramine (0·5%) in lanolin and "Vaseline" seems to exert a feeble action. The results are, however, rather variable.

The ointment consisting of 0·2% chloramine and 8% "Aerosol" was well tolerated in most instances. It neutralized the effect of the gas in concentrations of 1 in 80 to 1 in 50 in each of sixteen experiments when applied not later than thirty-five minutes after exposure. In a few cases application even after the lapse of one hour was effective. When applied after an hour the effect was doubtful. In three cases only an eyrthema developed when blisters occurred in controls; in five others typical blistering ensued.

The above-mentioned ointment proved to be non-irritating to the conjunctiva of rabbits, and it causes little, if any, irritation in the normal human conjunctiva. In the case of the human subject the ointment was applied to the conjunctiva of a group of seven normal persons. In each case only a slight burning sensation, which subsided, within a period varying from a few minutes to an hour, and which could be immediately abolished by the instillation of 3% boric acid solution, was experienced. This was accompanied during the first ten to thirty minutes by a slight injection of the conjunctival vessels.

In a case of *conjunctivitis vernalis* application of the ointment was followed by a slight discharge, which disappeared within twelve hours. This is not surprising, as the conjunctiva in such a condition is highly sensitive to chemical irritation.

The ointment prevented any clinical signs of irritation if applied to the conjunctiva of animals immediately (within ten minutes) after exposure to the gas in a concentration of 1 in 60.

Discussion.

One of the striking features of the mustard gas burns is the devitalization of the affected areas. The tissues are

easily injured and highly prone to secondary infections. The danger of a secondary septic infection is a real one. The use of crude cod liver oil after evacuation of the blister and removal of dead skin, as recommended by the author of "Medical Manual of Chemical Warfare",[4] may prove useful. The opinion, however, that in the case of extensive blisters "better results will follow the use of an unirritating antiseptic such as Dettol (20 per cent) in a freshly prepared 5 per cent solution of tannic acid" can hardly be shared. The risk of further damage to the injured tissue is not negligible. The warning of such an experienced dermatologist as Dr. E. H. Molesworth[5] to avoid any and every antiseptic application in the treatment of radio-dermatitis is equally applicable to the treatment of gas injuries of the skin. My present observations seem to convince me that a sulphanilamide ointment yields quite satisfactory results.

Summary.

1. An ointment containing 2% chloramine in lanolin and "Vaseline" is in the majority of cases effective, if applied immediately. Its disadvantage is the possibility of irritation of the skin if it is used in the concentration required.

2. "Aerosol" and probably many other "wetting agents" make it possible to use chloramine in a lower concentration and so to avoid its irritating effects. They also render effective the application of the ointment even after a delay from thirty-five to sixty minutes.

Recommendations.

Each first aid post should have available, besides a stock of 0·2% chloramine solution, one of chloramine "Aerosol" ointment ("Aerosol" may be replaced by another wetting agent). Persons in special danger of exposure to the gas should carry a small pot or tube of the ointment with them.

Acknowledgements.

My thanks are due to Professor C. G. Lambie, who kindly granted me facilities for research in his department. I am obliged to Professor Peter MacCallum, of the University of Melbourne, in whose department I undertook some preliminary experiments. I wish to thank Dr. V. Trikojus for his helpful and valuable advice. I also wish to thank Dr. E. Cohen, of the Safe Cross Laboratory, Melbourne, who explained to me the physical properties of wetting agents.

References.

(1) W. Mozolowski: "General Knowledge about the Chemistry of War Gases", *Polska gaseta lekarska (Praktyka lekarska* numbers 3 to 5), Volume XIII, March 25, 1934, page 35.

(2) J. Dadlez and W. Koskowski: "War Gases and their Effect on Human Organism", *Polska gaseta lekarska (Praktyka lekarska* numbers 3 to 5), Volume XIII, March 25, 1934, page 50.

(3) W. W. Duemling: "Wetting Agents", *Archives of Dermatology*, Volume XLIII, February, 1941, page 264.

(4) "Medical Manual of Chemical Warfare", 1940, page 33.

(5) E. H. Molesworth: "An Introduction to Dermatology", 1937, page 501.

Reviews.

A MEDICAL MISSIONARY'S STORY.

THOSE who care to read about the everyday life of a medical missionary cannot do better than peruse Dr. Paul White's "Doctor of Tanganyika".[1] For four years Dr. White has been stationed at the Mvumi Base Hospital in Central Tanganyika, at which 30,000 patients are seen annually, and has had to supervise also six other hospitals distributed literally all over Tanganyika.

The first point which strikes the reader of this modest little book is the enormous need for medical men, women and equipment in the tropical regions of the world. For example, the infant mortality rate under African conditions in one of the areas now served by Dr. White was 700 in 1,000, whereas with simple instruction along the line of recognized baby health principles and elementary medical treatment it has been reduced to 190 in 1,000. Again, Dr. White demonstrates the intimate connexion between sociology and medicine. He also records encouraging progress in the training of Africans to participate in the medical services. Dr. White rightly considers that his biggest single advance in hospital work has been the building up of simple pathology units run by trained Africans. Naturally Dr. White sets out the relation between religion and medicine. Those who deplore the Western divorce between the Christian faith and everyday living will be stimulated to read of the integrating power of religion on a man's personal and communal life; but, after all, this is the thesis of medical missions.

The author has a keen sense of humour and shows unfailing ingenuity in turning oddments into medical equipment, as note the anæsthetic machine made from a motor car foot pump, a football bladder, a broken stethoscope and a pickle bottle.

[1] "Doctor of Tanganyika", by Paul White, with an introduction by Archdeacon R. B. S. Hammond; Second Edition; 1941. Sydney: George M. Dash. Demy 8vo, pp. 100, with illustrations.

PROGRESS IN INDUSTRIAL AND ORTHOPÆDIC SURGERY.

"THE 1941 Year Book of Industrial and Orthopædic Surgery" has been published by "The Year Book Publishers".[1] This volume, like that of last year, has been edited by Charles F. Painter, who is orthopædic surgeon to the Massachusetts Women's Hospital and Beth Israel Hospital, Boston. The larger part of the book is devoted to orthopædic surgery—359 pages in fact; industrial surgery and medicine are dealt with in 55 pages. In the preface the editor states that he has had a plethora of material from which to choose because of the activities of two orthopædic bodies in America—the American Orthopædic Association, the parent body, with its own journal, and the American Academy of Orthopædic Surgeons, which has outgrown the parent body. However, the editor has not confined his attention to American work; reference will be found to British and Continental journals.

In the opening section, which is devoted to general observations, there is a subdivision on progress in orthopædic surgery. Here J. S. Barr, of the Harvard University, is quoted as stating that one of the outstanding characteristics of orthopædic surgery is that operative procedures are not standardized. As a rule more than one operation is available for the correction of an orthopædic disability. This is a suitable statement for the opening paragraph of this book, for the work consists of a series of descriptions of the views of different authors and of the methods of treatment used by them. To give a detailed review of such a book would require almost as much space as the book itself occupies. The value of the book to orthopædic surgeons must at once be apparent, for here is a selection by a responsible editor from the writings of men actually engaged in the practice and the study of the things about which they are writing. It is not to be expected that there will be general agreement about all the methods advocated, but it is certain that they will provide food for thought and possibly for healthy argument. When, therefore, the scope of the work is indicated, readers must be left to explore the book for themselves, which they will do if they are wise.

In the orthopædic part of the work there are sections on the osseous system, nerve diseases, paralyses, technique, osseous tuberculosis, tumours of the bones, gout, arthritis, fractures and dislocations, osteomyelitis, metabolic bone diseases and a miscellaneous section. In the part devoted to industrial medicine and surgery the sections are headed: introduction, general considerations, diagnosis, therapy and preventive measures. The general get-up of the book is excellent, and the many illustrations and skiagrams are splendidly reproduced.

[1] "The 1941 Year Book of Industrial and Orthopædic Surgery", edited by C. F. Painter; 1941. Chicago: The Year Book Publishers Incorporated. Crown 8vo, pp. 432, with 353 illustrations. Price: $3.00 net.

The Medical Journal of Australia

SATURDAY, MAY 30, 1942.

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THE EYES OF THE WORKER.

ABOUT two years ago reference was made in these columns to the prevention of blindness, and the whole range of the subject was covered from the *ophthalmia neonatorum* that takes its toll of human vision in the early years of life to cataract which descends like a cloud to darken the closing years of old age, when the mind can ill afford to lose impressions from the outside world. Passing reference was made to the prevention of blindness in industry. This is a subject which is growing in importance, not only because the pursuit of industry is daily becoming more intense owing to war activities, but also because industry is becoming more and more specialized. There are certain occupations in which first-class vision is essential, and everyone thinks it natural that those engaged or about to be engaged in such pursuits shall be submitted to a searching examination so that those who fail to reach a certain standard may be eliminated. The driver of a passenger train, the officer of the watch on the bridge of an ocean liner, the pilot of the commercial aeroplane, all must have certain acuity of vision, depth perception and so on if they are to "carry on" without disaster. Of course people agree that persons employed in this way shall have satisfactory vision for the obvious reason that the safety of the travelling public depends on such vision. The acquiescence of the community in these industrial provisions is essentially selfish, and the same is true of much of the acquiescence in the imposition of rigid tests of vision for those who enter the armed forces of the country. There is a curious lack of interest on the part of both employers and employees in any suggestion that the eyesight of the rank and file in industry should be investigated and supervised. It is true that industrial regulations for such measures as the guarding of machinery, which if faulty or out of order may injure the eyes, are accepted, but they have to be policed. The apathy is no doubt due to many reasons, and among them are a refusal to face facts, laziness and a misguided spirit of independence. Some people would rather remain in ignorance of a defect so long as the defect does not interfere greatly with their usual activity; or having discovered a defect, they seem to think that an acknowledgement of its existence will accentuate it. This is often seen at the onset of presbyopia, "when a man begins to play the trombone with a book"; it matters not that efficiency in work is impaired so long as the worker has not to confess openly that increasing age calls for the use of spectacles. Presbyopia is by no means the most important defect that has to be considered in regard to industrial efficiency, but it is so common that it may be mentioned in any popular discussion on the subject.

Reference to the role of ophthalmology in industry is opportune in view of the fact that in *The Journal of the American Medical Association* of February 21, 1942, which is described as an "industrial health number", there appears as a "special article" a report by the Committee on Industrial Ophthalmology of the Section of Ophthalmology of the American Medical Association. The report, which was presented at the fourth Annual Congress on Industrial Health at Chicago in January, 1942, appears under the names of Albert C. Snell, Arthur Culler and Hedwig S. Kuhn. Apparently in America the benefits of ophthalmology are not made freely available to those engaged in industry, for almost in the opening words of the report we are told that there is a vacuum, an open gap, between the service which the competent ophthalmologist, restricted to practice in the consulting room, "is prepared to offer and the ophthalmic needs of the ordinary industrial worker" who is not brought to the consulting room. "The vacuum is due to economic reasons or because of lack of understanding of the needs of employees for this service". The condition of affairs stated in this way implies that the services which ophthalmologists are prepared to offer are not sufficient. This may not be what is intended; but even if it is, we can still follow the authors of the report in their discussion on the scope of industrial ophthalmology. They divide the subject into five separate but interrelated parts: (*a*) the efficient use of vision in industry; (*b*) eye accidents—their prevention and the treatment of injury; (*c*) conservation of visual health (other than that relating to accidents)—its relation to general health and the relation of general health to efficient vision; (*d*) visual economics—the effect of vision on earning ability and on production; (*e*) medico-legal ophthalmology—its relation to compensation for eye injuries and to protective insurance liability and so on. Snell, Culler and Kuhn refer shortly to industrial accidents involving the eyes and devote practically the whole of their discussion to the first of their subdivisions—the efficient use of vision in industry. This really covers the whole subject. Perhaps the simplest way of dividing the subject would be to think of it in three sections: (*a*) vision in relation to the job, (*b*) the conservation of vision, and (*c*) medico-legal aspects. In regard to the first of these three, it will be necessary to consider the vision of the intending worker

and the acuity of vision required by the job he proposes to undertake. The term "intending worker" is used because vision and the job should ideally be considered before the worker embarks on a particular career. Obviously for many kinds of work no special stress will need to be laid on vision—the absence of any condition causing progressive deterioration of sight and ability to meet the visual needs of ordinary home life will suffice. When work demands constant use of the eyes and close attention, it will be necessary to determine the vision of the worker. This of course is not sufficient, for it will be necessary to know what acuity of vision is demanded by the proposed type of work. For such occupations as those of aeroplane pilot, navigating officer and railway engine driver this has been determined; but there are many occupations in regard to which no such determination has been made. Here is scope for investigation. At this point it will be useful to state that Snell, Culler and Kuhn describe the study of visual efficiency as including the following topics:

1. Basic elements of visual performance; the need for standards for essential functions of vision for specific jobs.
2. Methods and technique for the testing of vision.
3. Ways and means for the correction of visual defects.
4. The placement of employees according to visual qualifications.
5. Programmes of cooperation between management, employees, industrial medical departments and ophthalmologists in the establishment of practical methods for visual testing, correction and placement.

In regard to the conservation of vision (the second of our headings) a great deal might be written; it covers the whole field of industrial hygiene as applied to the eye and its disorders. It has to do with accidents to the eye and their prevention by the compulsory use of methods of protection and by education; and it has to do with the treatment of injured eyes. It is concerned with the regular examination of the eyes of workers in certain industries; it is concerned with lighting and the avoidance of glare; it is concerned with errors of refraction and their correction. And, strange as it may seem to those not skilled in medicine, the conservation of vision is inseparable from the general health of the body and in particular from certain questions of metabolism and diet that influence the eye and its function. Our third subdivision, medico-legal aspects, need receive no more than passing mention.

The application of ophthalmological knowledge to problems of industry has been shown to offer extensive and interesting fields for investigation; and an effort has also been made to show that the subject, in addition to its medical and purely industrial aspects, has a psychological side. It is a subject in which ophthalmologists as well as industrial hygienists should interest themselves, and might well be adopted by the Ophthalmological Society of Australia (British Medical Association) as the central theme for one of its annual meetings.

Current Comment.

INFECTIVE NEURONITIS OR THE GUILLAIN-BARRÉ SYNDROME.

THE condition described by Guillain and Barré in 1916, and known since by their name, has many other names, such as infective polyneuritis, polyradiculo-neuritis, infectious neuronitis, infective neuronitis, radiculo-neuritis with acellular hyperalbuminosis of the cerebro-spinal fluid and acute benign infectious myelitis. Seven cases of this symptom-complex were described in this journal by Eric Susman and Kempson Maddox in February, 1940. Their paper, in which they quoted Guillain and Barré's original description, covers the subject fairly completely from the clinical side and may be used by interested practitioners who wish to revise or add to their knowledge. The condition may be described shortly as an apyrexial malady occurring in childhood and early adult life; it has a fairly acute onset and is preceded by certain prodromata which may be vague; weakness is the most prominent symptom and moderately severe paresis or paralysis of the lower motor neurone type the outstanding sign; sensory disturbance is not pronounced. The patient is euphoric. The protein content of the cerebro-spinal fluid is greatly increased, but its cells are normal in number or absent. Recovery, Susman and Maddox point out, is usual. M. J. Fox and R. D. O'Connor have reviewed the literature and report four cases.[1] They credit Osler with having given a description in 1892 under the title "acute febrile polyneuritis", which applies to this syndrome. In discussing nomenclature, they state that the term neuronitis is appropriate, since it designates involvement of the whole neurone. They have collected records of 122 cases from the literature. In 49 of these 122 cases there was a history of some preceding disturbance, such as coryza, aches and pains and gastro-intestinal disturbance. In 70% of cases the condition occurred in patients between the ages of twenty and fifty years. This is not quite the same as the age distribution already mentioned. The prognosis is, as already stated, usually good. In the cases collected by Fox and O'Connor there was a 20% mortality. It is true in mitigation of this high rate that in 10 cases the deaths are explained as having occurred in war-time, at a time "when other hazards may have been somewhat greater than those encountered in civilian practice". In many of the reports of the 122 cases the cerebro-spinal fluid was not mentioned; in 52 cases a "significant increase" in protein was observed. Fox and O'Connor quote Guillain as having stated that unless the cerebro-spinal fluid protein exceeded 300 milligrammes per 100 cubic centimetres a case could not be regarded as belonging to the syndrome. When Fox and O'Connor state that in 56 cases the increase in protein was "significant" we must conclude that the content exceeded the 300 milligrammes insisted on by Guillain. The authors whose cases have been reviewed by Fox and O'Connor were apparently not all as careful or as complete as they might have been in making their clinical investigations. It is thus quite likely that some of the cases recorded as examples of the Guillain-Barré syndrome did not really fall into that category. This may not be really important and is no fault of Fox and O'Connor; what does matter is that once we describe a syndrome as having certain characteristics, these should always be recognized in the allotting of a case to the category until the passage of time has shown the original description to be inadequate.

Another interesting aspect of this condition is that of recovery and pathology. One of the patients described by Fox and O'Connor died, but permission for autopsy could not be obtained. One of the patients described by Susman and Maddox died, and no macroscopic or microscopic changes were found in brain, spinal cord or peripheral nerves. This patient died of bronchopneumonia eight weeks after admission to hospital, and although some improvement had occurred the muscles had not returned to normal when sudden collapse and death occurred. It is not reasonable to suppose that changes can occur in the spinal fluid and in the function of muscles without the occurrence of causative pathological change; but microscopic changes may be difficult to discover, and even in Susman and Maddox's case it is likely that a considerable degree of recovery of affected tissues had occurred. Fox and O'Connor quote Bradford, Bashford and Wilson as having found in six fatal cases of infectious

[1] *Archives of Internal Medicine*, January, 1942.

neuronitis œdema and petechial hæmorrhages of brain and spinal cord, and also degeneration in cells of the anterior and posterior horns. Reference to the article by Bradford, Bashford and Wilson[1] shows that in only four of thirty cases was the cerebro-spinal fluid examined, and in each of the four the fluid was normal. There is also nothing to show whether any of these four were included among the six in which post-mortem examinations were made.

From the foregoing it will be clear that though the Guillain-Barré syndrome is of great interest from both clinical and pathological points of view, further observations are needed, particularly recorded observations of the cerebro-spinal fluid. In all probability the cause is a virus, for Bradford, Bashford and Wilson were able to transmit the condition described by them from man to animals and also isolated and cultivated a virus. It has been said that a busy practitioner who diagnoses a spinal condition as a myelitis promptly sends the patient to hospital and has no practical interest in refinements of diagnosis. This is not always true. Those who are prepared to follow the course of an illness such as Guillain and Barré originally described will find interest and will also gain in diagnostic acumen and a sharpening of clinical sense.

SOME UNCHARTED ROCKS IN INTRAVENOUS ANÆSTHESIA.

ADVANCES in respiratory physiology as a rule make little impression on the medical profession at large, although of late their applications to anæsthetics and aviation medicine have been eagerly exploited by specialists in these branches of medical science. Some recent additions to our knowledge by C. A. Moyer, of Boston, are worthy of the attention of others besides specialists. They illustrate well the relationships between the various mechanisms controlling the act of respiration. They also suggest that important changes, hitherto unsuspected, may occur in the operation of these mechanisms during intravenous anæsthesia, so that the application of commonly used methods of resuscitation may be attended with great danger to the patient.[2]

The respiratory centre, as has been known for nearly a hundred years, lies in the grey matter of the medulla. In it an excitatory state is produced and discharged with an inherent rhythm, which is capable of variation by nervous and chemical influences, especially by the amount of carbon dioxide in the blood. Normally the breathing is adjusted to a rate and depth which remove enough carbon dioxide from the body to maintain the hydrogen-ion concentration of the blood and tissues at a remarkably constant value. The assumption that this fine control of breathing is primarily the work of the respiratory centre is less tenable today than it was before the discoveries of Heymans in the last two decades of peripheral mechanisms in the aorta and in the carotid sinus and carotid body, which are sensitive to physical and chemical changes in the blood, especially changes in the oxygen tension, and by this sensitivity also influence the respiration by reflex action through the respiratory centre. Proprioceptive reflexes are also capable of modifying the respiratory act in certain specific directions: inflation and deflation of the lungs stimulate expiration and inspiration respectively (the Hering-Breuer reflexes), while there are other sensory end-organs concerned in the reflex control of respiration in the respiratory muscles, in the carotid sinus and in the aorta.

Moyer has studied, by experiments on dogs, the effect of intravenous anæsthesia produced by drugs of the soluble hexobarbitone and pentobarbital types upon all these mechanisms controlling respiration, which he calls "respiratory drive mechanisms". He has shown that the anæsthesia produced by these drugs profoundly depresses the response of the respiratory centre to carbon dioxide, but that it effects a relatively slight depression of the respiratory reflexes set up peripherally. Hence the breathing during surgical anæsthesia induced by these drugs is likely to be largely or even wholly dependent upon these reflexes, chemical (carotid) or proprioceptive (vagal) for its maintenance. Now these reflexes may be simply depressed. Moyer found that a dog under moderately deep hexobarbitone anæsthesia ceased to breathe when it received pure oxygen instead of room air; it was resuscitated only with great difficulty by artificial respiration and the readministration of room air. The rise in arterial oxygen tension had evidently depressed the carotid and aortic respiratory reflexes, so that in the absence of an adequate "central drive" respiratory failure resulted. Moyer also found that in dogs anæsthetized with hexobarbitone blocking of the vagi by the application of cold caused slowing of respiration, which as the anæsthesia was deepened was depressed to such an extent that the animal died; this did not occur in dogs anæsthetized with ether or cyclopropane. Moyer also found that carbon dioxide excess accentuates the respiratory depressant effect of soluble hexobarbitone and pentobarbital, while oxygen deficiency masks it when the anæsthesia induced is light. Finally Moyer found that any diminution in the size of a lung, such as may occur when the pleural cavity is surgically opened, stimulates the breathing when a barbiturate is employed as the anæsthetic; hence it is easy in the course of thoracic surgery in man to give an overdose of the anæsthetic during the period of increased pulmonary ventilation. When the lung is reexpanded or removed it is possible that breathing may stop; this danger does not occur when ether or cyclopropane is the anæsthetic agent. Again, if during thoracic surgery the lungs are mechanically distended, as is often done to stabilize the mediastinum and promote respiratory exchange, a Hering-Breuer reflex may be set up and the breathing slowed. Cyanosis may then appear. If a barbiturate anæsthetic is being given and if a high proportion of oxygen is now given in the breathing mixture to combat the cyanosis, the respiration may be further and gravely depressed. An alarming situation would now confront the anæsthetist, and Moyer suggests that it would be best met by adequate artificial ventilation of the lungs with a mixture containing 20% to 40% of oxygen, with perhaps 5% of carbon dioxide to counter any acapnia resulting from too vigorous artificial respiration. The intravenous injection of two to four minims of adrenaline would be helpful if the blood pressure had fallen. This situation would not arise if ether or cyclopropane were the anæsthetic agent.

Moyer concludes that should one choose to administer soluble hexobarbitone or pentobarbital to man for surgical anæsthesia one must accept the risk of changing the control of breathing and of the acid-base balance in an unpredictable manner. In transpleural surgery he regards these drugs as emphatically contraindicated. Here we can follow him. But he goes further and states that because of their disturbance of the mechanisms of respiration they are inferior anæsthetic agents which should not be used for any but short, relatively atraumatic procedures. Here his opinion may be doubted by the ever-increasing numbers of anæsthetists, specialists and others who are using these drugs with skill and success for a great variety of lesser surgical procedures. But it should at least give pause to these, and every prospective user should ask himself if he is entirely familiar with the modifications of respiratory physiology which the drugs induce and whether he is equipped and knows what best to do instantly to combat any dangerous effects that may become manifest. This self-examination may be all the more necessary in this country, because the competent authority has advised that the import of the safer alternative anæsthetic agent, cyclopropane, should be prohibited, and soon it may be unobtainable for those who stand in need of it.

[1] J. R. Bradford, E. F. Bashford and J. A. Wilson: "Acute Infective Polyneuritis", *The Quarterly Journal of Medicine*, Volume XII, 1918-1919, page 88.

[2] *The Journal of Thoracic Surgery*, December, 1941.

Abstracts from Medical Literature.

DERMATOLOGY.

Shoes and Slippers as a Source of Infection in Ringworm of the Feet.

R. C. JAMIESON AND A. MCCREA (*Archives of Dermatology and Syphilology*, November, 1941) present a study of shoes and slippers as a source of infection and reinfection in ringworm of the feet; they also present a supplementary study of a small series of cases to determine whether the organisms found in the shoes and on the skin were identical. The authors quote Berberian, who found that fungi could be grown from washed stockings of infected persons. The object of the study was the determination of the presence of pathogenic as well as non-pathogenic fungi in the shoes of persons who clinically had dermatophytosis of the feet. The upper surface of the inner sole of the shoe in active use was curetted for scrapings, but in some instances both new and old shoes were examined. Sabouraud's formulæ were used for the growing of cultures. With the finding of organisms in 40% of cases in this series and the results doubtful in 34%, it appears that actual and probable infection of the inner soles of shoes is widespread. *Tinea interdigitale* was found to be the most frequent invader, *Trichophyton violaceum*, microsporon and epidermophyton being present in only a few cases. In the shoe-foot series 25 cases were studied microscopically and in 18 of these dermatophytosis was present. In 12 of the 18 cases the same pathogens were present in the skin and in the shoe. The authors' study reveals that a fairly large proportion of persons with fungous infections of the feet are able to contaminate the shoes they wear, so that such shoes, if unsterilized, are potential sources of reinfection to the original wearer or may cause a new infection if worn by a person previously uninfected.

Nummular Eczema.

P. GROSS (*Archives of Dermatology and Syphilology*, December, 1941) discusses the clinical picture and successful therapy of nummular eczema. The name denotes the appearance of the discrete, coin-shaped patches of this condition. The lesions are erythematous plaques studded with small vesicles or papulo-vesicular lesions. Oozing from numerous pin-points leads to crusts. Œdema in the acute stage and thickening and scaling in the more chronic phase complete the rather uniform picture of the lesions. Patches are frequently the size of small or large coins and a discrete outline is present. The location and distribution are of importance. The dorsal surface of the hands and fingers, the extensor surfaces of the forearms, arms, legs and thighs, and the backs of the feet and shoulders are the sites most frequently involved, in the order mentioned. The pruritus of patients with nummular eczema varies. In some cases it is severe; in others it is particularly noticeable at the outbreak of new lesions. It is more common in cold weather. The author states that the differentiation of widespread nummular eczema from contact dermatitis is comparatively easy, as the latter is a diffuse eruption, occurring especially on the dorsum of the hands and spreading to the flexor surfaces of the wrists and forearms, to the cubital fossæ and to the flanks. The lesions of contact dermatitis are polymorphous in contrast to the uniform lesions of nummular eczema. In the differentiation of nummular eczema from dermatophytosis the tendency to central healing and peripheral progression should be remembered. It should also be borne in mind that the volar surfaces of the hands and fingers are the favourite sites of fungous infection. The author thinks that frequent association of nummular eczema with a dry skin and even asteatotic eczema is of some significance, and he assumes that asteatosis is a predisposing factor in nummular eczema. Well-known facts about the asteatotic dry skin point to the role of vitamin *A* in the maintenance of normal skin. The question arises whether the unfavourable effect of the cold season on asteotosis as well as on nummular eczema is due to lowered vitamin *A* content of winter food or to decreased function of the sebaceous and sweat glands. The use of vitamin *A* in the treatment of nummular eczema appears rational to the author. He states that patients with nummular eczema receiving vitamin *A* responded promptly to treatment, that the tendency to recurrence was decreased and that if the condition did recur it was milder and could be controlled by increased dosage of vitamin *A*. Vitamin *A* was given in amounts from 30,000 to 75,000 U.S.P. units per day for therapeutic doses, and 25,000 U.S.P. units or less were given as a maintenance dose. Topical applications of bland ointments were prescribed, such as cold cream, zinc oxide with a lard base, or a 3% solution of colloidal tar in a vanishing cream base. The use of soap and water for cleansing was discouraged while active lesions were present.

Treatment of Lupus Erythematosus with Bismarsen.

R. C. WEISS, A. H. CONRAD, A. H. CONRAD, JUNIOR, AND R. O. PFAFF (*Archives of Dermatology and Syphilology*, December, 1941) report on a series of 28 patients suffering from discoid *lupus erythematosus*, whom they treated with bismarsen (bismuth arsphenamine sulphonate). The authors selected only those patients who, after a thorough physical examination, were thought fit to tolerate the treatment. The contraindications for the use of bismarsen are stated as follows: cachexia, severe anæmia, endocrine disturbances, advanced tuberculosis of the lungs, cardiac insufficiency, hæmorrhagic disease, epilepsy and alcoholism, and severe renal dysfunction. The dosage employed was as follows. The tolerance of the patient was tested by the administration of 0·05 gramme of the drug twice a week for one week. The dose was then raised to 0·1 gramme twice a week, and in many cases after the drug was found to be well tolerated the dose was raised to 0·2 gramme twice a week. All injections were given intramuscularly. Fourteen out of the 28 patients so treated made a complete recovery, 12 patients showed improvement, and two patients showed no improvement. With the exception of one case of purpura, no blood dyscrasia was encountered. Caution is necessary in the use of the drug. As with the use of gold, constant observation of the skin and frequent blood counts are necessary. Nitritoid reactions may occur. The authors state that the significance of their report lies not so much in the results reported at this time as in the fact that a combination of heavy metals in the form of a double salt may cause involution of the lesions of discoid *lupus erythematosus*. This fact may lead to further experimentation with other metals and thus perhaps to the discovery of less toxic and more effective drugs.

Impetigo.

J. T. INGRAM (*The Practitioner*, November, 1941) discusses impetigo in its relation to the war effort, on account of its prevalence and contagiousness and because of the fact that it requires at least ten days' treatment. The author points out that if treatment is not along rational lines the period can readily be extended to four or five weeks. It cannot be too strongly emphasized that ointments as such, including *Unguentum Hydrargyri Ammoniati Dilutum*, should never be employed, for they merely ride upon the surface of the infected serum that is being poured out, and facilitate the spread of the infection. For the smooth, non-hairy skin, Lassar's paste with ammoniated mercury (2%) is most effective. It absorbs exudate and remains on the infected surface, and it should not be unnecessarily disturbed once it has been applied. Watery solutions of dyes (gentian violet or brilliant green) are effective, or the combination of dye and mercury may be used, as in the following prescription: brilliant green 0·5 part, perchloride of mercury 0·5 part, industrial spirit to 100 parts. *Eau d'Abbour* with equal parts of hot water followed by a dusting powder or a heavy calamine lotion is effective; or compresses of 1 in 4,000 potassium permanganate solution may be used. The administration of "M & B 693" (one tablet four times a day for seven days) tends to hasten recovery, and "M & B 693" or sulphanilamide as a local application (in any vehicle other than an ointment) is more efficacious still. The author thinks that the improved results of sulphonamide therapy are in part due to the rational character of the vehicle employed, and not so much better than those obtained from other lines of treatment as to justify the use of a dangerous drug and the risk of sensitizing a patient to a measure of which he may later be vitally in need for the treatment of serious war injuries.

UROLOGY.

Stricture of the Urethra.

F. M. LOUGHNANE (*The Journal of Urology*, December, 1941) thinks that, in contrast with the great prominence given to the subject in the past, the teaching hospitals of the present day are strangely neglecting consideration of urethral stricture. Judging by the attempts of house surgeons to pass sounds, bougies and catheters, the author is convinced that the worship of force is still in the ascendant. The important part that œdema or spasm,

or a combination of both, may play in aggravating the obstructive effect of an organic stricture must always be borne in mind. Exceeding gentleness is the basis of good instrumental treatment. Modern methods of diagnosis afford far more precise information about urethral strictures than were usually obtained in the past; in this respect urethroscopy, and to a greater extent urethrography, are of inestimable value. Treatment by intermittent dilatation, with the use of a local anæsthetic injection before each attempt, is preferred by the author to all other methods. Internal urethrotomy is the cutting operation of choice and should be reserved for strictures which do not respond to dilatation or where a large calibre canal is required for cystoscopy, litholapaxy or endoscopic prostatic resection. Dilatation at increasing intervals should follow internal urethrotomy. External urethrotomy is, in the author's opinion, an operation of necessity, not choice, and is indicated only when a stricture is impassable or perineal fistulæ are present. In the author's operation the bladder is opened suprapubically, a sound is passed from above and is cut down upon in the urethrotomy wound. A rubber tube, 22F, which has been passed along the anterior part of the urethra is drawn back by the sound into the bladder. This long tube projects from both the suprapubic wound and the external meatus, and is transfixed at both these points by safety pins. It is moved slightly back and forth once a day, and both it and the bladder drain are not removed till the perineal wound is soundly healed. Actually the stricture lumen is not opened and the fibrous stricture is "by-passed" by the tube, which stimulates the formation of a mucosa-lined tube around it continuous with both segments of the urethra. The author is strongly opposed to the modern operation of complete excision, and states roundly that it has nothing to recommend it.

Interstitial Cystitis.

E. SMITH AND F. D. CONROY (*The Canadian Medical Association Journal*, October, 1941) consider that interstitial cystitis is the best descriptive term for the clinical entity which is more commonly known as Hunner's ulcer of the bladder. No ulceration is present, but there is a chronic inflammation, involving all coats, most commonly towards the vertex of the organ, but frequently descending on the lateral walls and never involving the trigone. The ætiology is as yet unknown, but the urine is typically clear from any trace of pus and is not infected. The outstanding symptom is increased frequency of urination, which is the more distressing since, at the end of twenty to thirty minutes the desire to urinate is urgent on account of intense suprapubic pain. These symptoms are present without the coexistence of any perivesical inflammation or surrounding adhesions. Past experience has proved that resection even of the whole vault of the bladder has failed to maintain relief or to prevent recurrence. At present the best form of treatment is over-distension of the organ under spinal anæsthesia with very light and superficial electrocoagulation of any more acutely inflamed areas of mucosa. Usually lines of scarring across the vault and lateral walls are cystoscopic evidence of the underlying panmural inflammation and the over-distension causes such areas to bleed. This is an important diagnostic sign of this clinical entity. The patient is usually a woman of over forty years. Some clinicians have never encountered a case in a man. The patient should be warned, after treatment, that the symptoms may occur again in a month or a few months' time. A permanent cure may be expected after several treatments only in about 20% of cases.

Urinary Calculi.

F. R. MOORE (*United States Naval Medical Bulletin*, January, 1942), with 46 cases as a basis, has studied the application of recent developments in pathogenesis of urinary calculi, their ætiology and treatment and prevention of recurrences. The calculi were renal in 10 cases and ureteral in 36. The author states that the causes of urinary calculi fall into six main groups: (i) infection with or without stasis, blood clots and foreign bodies; (ii) metabolic disturbances; (iii) vitamin *A* deficiency; (iv) diet; (v) drugs; (vi) fluid imbalance. With regard to infection, the organisms involved in the author's cases were *Staphylococcus albus*, *Bacillus coli communis*, *Bacillus proteus*, an α-hæmolytic streptococcus and *Bacillus influenzæ*. When stasis is present in any part of the urinary tract it should be eliminated. Metabolic causes were gout, cystinuria, hyperparathyreoidism, hypercalcinuria and oxaluria. Although the results of recent work are not conclusive, they suggest that a diet deficient in vitamin *A* is probably an important factor in the formation of urinary calculi and in recurrences of the condition. The consumption of excessive amounts of milk and cheese may predispose the subject to the formation of calculi. Patients on a Sippy régime, because their urine is alkaline for a long period of time, should provide ideal conditions for the formation of urinary calculi; work on this aspect has led to conflicting results. Ammonium chloride and acid sodium phosphate, frequently used as acidifying agents, may produce hypercalcinuria and in this way provide a basis for calculus formation. Sulphanilamide, sulphapyridine and sulphathiazole may cause calculi to form. Fluid imbalance, noted in hot climates in which perspiration is excessive and urinary output is low, is certainly a factor in the formation of uric acid and oxalate calculi. This is noticeable among workers in firerooms or other hot areas aboard ship. The patients are usually free from renal infection; they have small, sharp, irregular calculi, which are not usually revealed by X-ray examination, but are diagnosed by means of the ureteral catheter, either plain or wax-tipped. Renal colic is severe and the urine is loaded with erythrocytes. In the diagnosis of urinary calculous disease several steps are necessary: (i) X-ray examination; (ii) a careful clinical history, with special attention to dietary habits; (iii) careful examination of the urine, with cultural methods and with Sulkowitch's solution (for determination of the calcium content); (iv) examination of the blood for calcium and phosphorus content, if much calcium is present in the urine; (v) chemical analysis of the calculus. The author refers to surgical removal of calculi and stresses the importance of renal suspension to insure adequate renal drainage in all cases. Parathyreoidectomy is indicated for calculous disease associated with hyperparathyreoidism. Transurethral manipulation of ureteral calculi has been successfully used for several years. With regard to medical treatment, all patients who have had calculi composed of phosphates or carbonates should have an acid-ash diet with vitamin *A* and a large amount of fluid. Foods of high calcium content should be eliminated; this treatment will be effective also with calcium oxalate stones. If the patient suffers from endogenous oxaluria, the stone formation will probably continue unchecked. For cystine and uric acid stones a combination of treatment with alkalis, large amounts of fluid and a diet poor in protein is often successful. Urinary tract infections after the removal of calculi must be eliminated; sulphanilamide and sulphathiazole are useful. Foci of infection should be sought in teeth, tonsils, sinuses, middle ear and intestinal tract, and in prostate or cervix. The author has had no success with dissolution of stones, but states that he will "keep trying". To assist in the prevention of recurrence, six measures are recommended: (i) eliminate infection and secure good drainage; (ii) force fluids; (iii) give an acid-ash diet, except in the case of uric acid and cystine calculi; (iv) give adequate vitamin *A*; (v) eliminate foods or drugs that produce high hypercalcinuria or alkaline urine; (vi) in all cases make frequent urinary and X-ray examinations.

Pyeloplasty.

V. J. O'CONNOR (*The Journal of Urology*, December, 1941) has reviewed 36 operations in which he employed pyeloplastic conservative methods in treatment of hydronephrosis. It is pointed out that no single technique is applicable to all patients. Pyelo-uretero-neostomy (Kuster-Quinney technique) was employed for six patients, all of whom had "sizable aberrant vessels at the site of obstruction". All had satisfactory results in regard to function and mechanical drainage. In every case drainage was obtained by nephrostomy. Three patients who had a splint in the neostomy opening for eleven to twenty days had a much more satisfactory pelvic outlet. Fenger's operation (Heinske-Mikulicz principle) was carried out on three patients with successful results. Drainage was secured by pyelostomy and satisfactory reduction in the size of the redundant pelvis occurred in every instance. This technique is not recommended, as the author deems it inferior to other methods. The Finney type of pyeloplasty was used for two patients. In one case the patient died on the seventh day from septicæmia, due to inadequate drainage by pyelostomy. The second patient has an unsatisfactory functional and anatomical result after eleven years. The anterior Y-V operation of Schroyzer was applied to seven patients, all of whom had a very satisfactory result. The author prefers this operation when conditions are suitable for its application. It does not always correct a high implantation of the ureter. The posterior inverted Y-V operation of Foley was employed for eighteen patients. In all nephrostomy drainage was employed for two to four weeks and a splint was used in each instance. A death occurred in this group owing to pulmonary embolism on the fourteenth day. One patient has a permanent nephrostomy and two others are "unsatisfactory as to pelvic outline and renal function".

Medical Societies.

THE MEDICAL SCIENCES CLUB OF SOUTH AUSTRALIA.

A MEETING of the Medical Sciences Club of South Australia was held at the University of Adelaide on October 3, 1941.

Defects in Eggs.

MR. M. A. C. STIDSTON presented a paper on "Defects in Eggs, and other Matters under Investigation at the Parafield Egg Investigation Laboratory". He said that the laboratory was established in 1938 under a grant from the Egg Producers' Council and the Council for Scientific and Industrial Research. The value of the production of poultry and eggs in Australia exceeded £12,000,000 annually, South Australia's share being £1,000,000. South Australia produced seven to eight million dozen eggs, and in the season 1940-1941 had exported 65,000 cases of eggs (each 30 dozen) and 18,000 tins of egg pulp (each 40 pounds).

The question of whether or not an egg was sterile when laid was discussed. The mechanism of rotting was considered and the classification of rots of bacterial origin was described, with details of the method of recording the appearance of an egg at internal examination.

Mr. Stidston explained that work in progress at Parafield included the examination of the influence of diet on (*a*) the production, (*b*) the keeping qualities of the eggs, and (*c*) the bacterial flora, if any, of the new-laid egg. Other work on the resistance of the ovary and oviduct to infection with *Pseudomonas* bacteria had been commenced.

Problems concerning pulping of eggs and the bacterial content of egg pulp were described. However perfect the method of pulping might be, the pulp produced could not contain fewer organisms than the original eggs. Similar problems were found in connexion with the drying of eggs. Dried egg had the advantages of saving of cargo space and saving of refrigeration both in transport and when the product reached its destination. Provided the product had a sufficiently low water content it could be stored at atmospheric temperature.

Demyelination.

PROFESSOR E. W. HURST presented a paper on "Demyelination brought about by Various Chemicals". An account of this work was given by Professor Hurst in the G. E. Rennie Memorial Lecture published in this journal on December 13, 1941.

Post-Graduate Work.

THE NEW SOUTH WALES POST-GRADUATE COMMITTEE IN MEDICINE.

THE New South Wales Post-Graduate Committee in Medicine announces that its future address will be 145, Macquarie Street, Sydney.

Beginning on Monday, June 22, 1942, a series of lectures and demonstrations will be given at 4.30 p.m. each Monday. These will include lectures on air raid and military subjects, demonstrations of medical films, and the clinico-pathological conferences previously held at the Prince Henry Hospital. The programme and place of the lectures and demonstrations will be announced later.

Arrangements for post-graduate instruction in any subject will be made on application.

Correspondence.

GLYCERINE OF BORAX.

SIR: That some medical practitioners still continue to use this preparation in the treatment of thrush in infancy makes me sad. How long is it since careful experiment showed that the continued administration of small quantities of borax to healthy university students caused serious disturbance of health? How long have we been forbidden to add small quantities to butter and other foods? Yet we continue to put this slow poison into babies' mouths!

Perhaps its use for a few days only causes no appreciable harm; but I have known mothers and nurses, encouraged by medical example, to use glycerine of borax persistently to "clean" babies' mouths. It is never necessary. For many years I have treated thrush with nothing but a mouth wash of dilute peroxide of hydrogen. How far the disappearance of the fungus is due to this remedy I do not know. But at least it does no harm.

Yours, etc.,

A. JEFFERIS TURNER, M.D.,
Late Director of Infant Welfare in Queensland.

Brisbane,
May 17, 1942.

MEDICINE, WAR AND PEACE.

SIR: Necessarily every citizen is vitally interested in the problems of war and peace. The physician has a special interest in the problems, for he is intimately concerned with many of them. It is he who judges the fitness of men for military service; he who tends the sick and wounded in the field; he who cares for such of them who survive through many years. He too cares for sick and wounded civilians who are the helpless victims of total war; and it is he also who ministers to those ailing as a result of the many pestilences which accompany war.

Three thousand years ago the great poet Homer said that the life of the physician is as the lives of many men. That saying is still true. Because of his importance in the life of the community the physician has qualities for leadership; and in the field which is concerned with the problems of life and peace he certainly should play a useful part.

Medicine, too, as a science, is international; it knows no frontiers. International conferences have covered the field of sanitation; quarantine is an international matter; bureaux of health function (in peace-time at least) for the international community. Standards for drugs are global. The medical man as a factor for world peace therefore has a tangible foundation.

Medical men indeed have not ignored their status. In the Balkan areas before the war they were actively interested in the possibility of federal union as a means of preserving peace. Physicians in England also found time to consolidate themselves into a group working for a similar end. In Australia several years ago an International Peace Conference was held, the venue being in Melbourne; a medical commission, as part of the conference, gave scope to medical men of the continent to consider ways and means for possible peace. Here and there, too, individual medical men have used their voice and pen seeking practical solutions to the supreme problems.

For they are supreme. The present system of international anarchy coupled with global war implies the reign of fear, the tyranny of armed strife, the monarchy of the pestilences which accompany war, and the enthronement of dysgenic forces which annihilate the flower of the manhood (and the womanhood) of the nations of the whole earth. They are supreme, because man, who should be the master, becomes the slave, and because life and health are subordinated to disease and death.

The medical man is vitally interested in the biological aspects of war and peace. In the psychological aspect he is (or should be) interested in the special part that instincts (such as those of pugnacity, acquisitiveness and gregariousness) and emotions (such as that of fear) play in the making of war. Those instincts can be guided into useful channels. The pugnacious instinct can find an outlet in the healthy rivalry of games; while the herd instinct (or instinct of gregariousness) can be used in building a bigger unit than that of the nation; it can play a vital part in making that supreme unit, the federation of the world.

Because of his scientific training the medical man finds no insuperable difficulty in pondering on ætiological factors; treatment is an everyday concern. It is true that in his general practice he is mostly restricted to matters concerning the individual patient; but in the wider field of public health he has to think globally. Diseases can be pandemic.

Today war is a pandemic disease; it is man-made; and peace, when it comes, will also be man-made. The causes of war are known, just as the causes of typhoid fever and of malaria are known; the ætiological factors in the origin of hostilities are as clear as the factors concerned in the causation of scurvy and of rickets. Existing international political organization has means for the prophylaxis of war; they include negotiation, diplomacy, conference, administration, arbitration and mediation; but those means are insufficient to prevent periodic local or general outbreaks of the great scourge; and they are inadequate from the point of treatment. Today, at a cost that may reduce

wealthy nations to penury, and which takes a heavy toll of lives, war is the arbiter in matters (mostly economic) which can be, and which ought to be, decided by political or by legal (that is, by peaceful) means.

The Great War was terminated by the Treaty of Versailles and subsidiary treaties; from that great settlement came a confederation, the League of Nations. But the therapy of the League was below the standard which should be used; for the League lacked governmental and coercive power. Truly a more powerful remedy must be devised. That remedy lies in the authority of a world-wide federal union, which will bring law and order to a waiting world. Is it too much to expect that the worthy profession of medicine will play a noble part in the making of this union?

Yours, etc.,

S. J. CANTOR.

Princess Park,
Kew,
Victoria.
Undated.

HEAT AND COLD IN THE PREVENTION AND TREATMENT OF SHOCK.

SIR: In the *Archives of Surgery*, June, 1941, Blalock and Mason publish results of significant experimental work on the effects of heat and cold in the prevention and treatment of shock, wherein it is shown that heating animals which have been subjected to bleeding or trauma reduces the survival time as compared with animals which have been cooled. Both heating and cooling appear to reduce the number of ultimate survivals.

The extent of heating and cooling which the authors use is greater than that which one would expect clinically, but they do draw attention to the fallacy of putting a shocked patient in a heating cradle merely because he has a low skin temperature. With embarrassment of the circulatory system one of the earliest compensations is constriction of skin vessels with consequent reduction in skin temperature if the surrounding atmosphere is at a lower temperature than the normal skin temperature. It becomes necessary, therefore, in cases of shock to determine whether or not the rectal temperature is reduced before deciding whether the body temperature has fallen. When the body temperature has been shown to be low by this method, heating would appear to be reasonable so long as the body temperature is carefully followed by means of a rectal thermometer. At no time, however, should the heat be so energetic that it results in dilatation of skin vessels. Otherwise an added embarrassment is thrown upon the circulatory apparatus by decreasing the peripheral resistance in this manner, that is, the use of the heating cradle should not be routine in shock, but should be judiciously applied with the help of a rectal thermometer.

Yours, etc.,

R. DOUGLAS WRIGHT,
Professor of Physiology.

The University of Melbourne,
May 18, 1942.

MEDICAL MILITARY EMERGENCIES.

SIR: The article by Dr. S. F. McDonald on medical military emergencies will appeal to anyone who has served in a war.

In the Egyptian campaign causes of the neuroses were obvious, and in war there is only one cause, the natural fear of death. This is overpowered with most soldiers by determination to do their duty, and in the case of officers by fear that they may fail in their job.

I saw two cases of interest. One man was paralysed and anæsthetic from the waist downward, and the other had a pulse which could not be counted. Yet both recovered within a fortnight when they knew they could not be sent into the line.

At one period and in one place there were hundreds of men in most cases not quite fit and others worse off. They were dealt with by sending the best into the line and the others to work, often hard work, on the lines of communication or the base. It worked well. Had they been treated as neurotics or suffering from organic diseases, that would have been an end of them as soldiers.

As regards diseases such as malaria, a similar course was followed. They were mostly of the benign and recurrent types. They were sent to units behind the line, treated in a small detention hospital during an attack, and put to work between the attacks. This procedure pulled them together and usually cured the disease.

There are 650 million people suffering from malaria on the globe and about four million deaths a year.

At the battle of Megiddo, General Sir Harry Chauvel lost about 20,000 effectives from this cause in nine weeks. If the figures given for the Bataan Peninsula are correct, that is, 40,000 cases, the defeat is understandable.

Dengue in Australia is serious, and the anti-mosquito campaign may prevent not only dengue, but the spread of malaria. Yellow fever is possible and can be prevented in the same manner, but there are several varieties of mosquito which carry this disease.

I have set out in my publication how "D.A.H." was practically eliminated as a serious cause of disability.

Finally steps should be taken to provide a vaccine for yellow fever for the use of those who attend to such cases if they appear.

Summing up, all the men not quite fit but not suffering from serious organic disease can be benefited and made useful by putting them to necessary work.

In Egypt about two men were wanted to support each fighting man. In Australia the proportion would be greater, as Australia has to produce so much war material, whereas in Egypt so much material came from the Mother Country.

The whole problem is one of medical common sense. It is very easy to immobilize a large number of men by ill-considered good nature.

Yours, etc.,

JAMES W. BARRETT.

103-105, Collins Street,
Melbourne, C.1,
May 19, 1942.

Naval, Military and Air Force.

APPOINTMENTS.

THE following appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 139, of May 14, 1942.

AUSTRALIAN IMPERIAL FORCE.

Australian Army Medical Corps.

The following changes *et cetera* are made:

The undermentioned officers are seconded from dates shown: Captains QX24533 H. Glynn-Connolly, 5th November, 1941, and A. F. McSweeny and A. W. Eklund, 7th November, 1941, and C. H. Mansfield, 22nd November, 1941.

LECTURES IN ADELAIDE.

ARRANGEMENTS are in hand for a course of lectures on "The Neuroses in War-Time", to be given under the auspices of the Deputy Director of Medical Services, South Australian Lines of Communication Area. The lectures will be held at the Institute of Medical and Veterinary Science, Frome Road, Adelaide, on successive Wednesday evenings at 8.30 p.m. The first lecture was held on Wednesday, May 27, 1942; the course will be continued on June 3, 10 and 17. The following officers will deliver lectures: Lieutenant-Colonel H. K. Fry, D.S.O., Major R. Whishaw, Captain A. J. M. Sinclair, Captain H. J. B. Stephens, Captain W. A. Dibden.

The course will provide a comprehensive review of the neuroses, their nature, causation, prevention and management. Special attention will be paid to work done in the present war and to modern methods of treatment. The course is open to all medical officers and nursing sisters of the Royal Australian Navy, Australian Army Medical Corps and Royal Australian Air Force. Medical practitioners and medical students are also invited.

National Emergency Measures.

THE DEPARTMENT OF INFORMATION.

THE following statement has been issued by the Department of Information.

What Every Australian Should Know.

Emphasizing that in the event of air attacks dispersal is the keynote of protection, the Department of Home Security urges the public to avoid concentration in large numbers in the city.

It is suggested that this might best be achieved by shopping locally, by leaving children at home when the city area is visited, and by avoiding visits to the city at night-time under brown-out conditions. Large congregations of people are considered a danger at any time when air raids are a possibility, and the department, in view of experiences in other countries, urges that masses of people should not congregate.

If Attack is Sudden.

It is important to learn now where public shelters are located so that these may quickly be reached in an air raid and in an orderly fashion. Remember that if unable to reach a building or to take cover, the best protection is to lie face downwards in the gutter with the hands over the ears, elbows on the ground supporting the weight of the body, and the mouth open.

Live Wires.

Electric wires brought down during an air raid are a danger. They must always be treated as live wires. Keep away from any wires on the ground. You should report any fallen wires to your local air raid warden at the earliest opportunity.

Summing up, the golden rule to follow in an emergency is to not to panic, be calm, take cover and stay put.

Special Notice.

IT has come to the knowledge of the Australasian Medical Publishing Company, Limited, that telephone inquiries have been made of Victorian medical practitioners regarding details of war service for inclusion in a projected new edition of "Knox's Medical Directory". Medical practitioners are informed that this is being done without the knowledge or consent of the company, which is proprietor and publisher of the directory. No new edition is contemplated in the early future.

Notice.

A MEETING of the clinical section of the Medical Board of the Royal Prince Alfred Hospital will be held on Tuesday, June 9, 1942, in the A2 lecture theatre of the hospital at 4.30 o'clock p.m. The meeting will take the form of a clinical demonstration by the Department of Radiology, lasting approximately one hour. Medical practitioners are invited to be present.

Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Stuckey, Douglas Seavington, M.B., B.S., 1941 (Univ. Sydney), 57, Spit Road, Mosman.

The undermentioned have applied for election as members of the Victorian Branch of the British Medical Association:

Saleh, Michael George, M.B., B.S., 1928 (Univ. Sydney), 238, Latrobe Terrace, Geelong.

Wallace, Frederick Hilton, M.B., Ch.M., 1917 (Univ. Sydney), 10, Ryrie Street, Geelong.

Phillips, John Richard, M.B., Ch.M., 1925 (Univ. Sydney), 31, Steinberg Street, Bendigo.

Books Received.

"Cardiac Symptoms in the Neuroses", by Doris M. Baker, M.D., M.R.C.P. (London); 1942. London: H. K. Lewis and Company Limited. Crown 8vo, pp. 56, with 7 illustrations. Price: 4s. 6d. net.

"Hours of Work, Lost Time and Labour Wastage", Medical Research Council, Industrial Health Research Board Emergency Report, Number 2; 1942. London: His Majesty's Stationery Office. Royal 8vo, pp. 30. Price: 6d. net.

"The Australian Mothercraft Book", by various authors, edited by Marie Brown, M.B., B.S. (London), D.P.H. (Sheffield), Constance Finlayson, M.B., B.S. (Melbourne), and Helen M. Mayo, O.B.E., M.D. (Adelaide); published for the Mothers and Babies Health Association of South Australia; Second Edition; 1942. Adelaide: Rigby Limited. Crown 8vo, pp. 200, with illustrations. Price: 2s. 6d. net.

Diary for the Month.

JUNE 3.—Western Australian Branch, B.M.A.: Council.
JUNE 4.—South Australian Branch, B.M.A.: Council.
JUNE 5.—Queensland Branch, B.M.A.: Branch—Joseph Bancroft Memorial Lecture.
JUNE 9.—Tasmanian Branch, B.M.A.: Branch.
JUNE 12.—Queensland Branch, B.M.A.: Council.
JUNE 17.—Western Australian Branch, B.M.A.: Branch.
JUNE 25.—New South Wales Branch, B.M.A.: Branch.
JUNE 25.—South Australian Branch, B.M.A.: Branch.
JUNE 26.—Queensland Branch, B.M.A.: Council.
JUNE 26.—Tasmanian Branch, B.M.A.: Council.
JULY 1.—Western Australian Branch, B.M.A.: Council.
JULY 2.—South Australian Branch, B.M.A.: Council.
JULY 3.—Queensland Branch, B.M.A.: Branch.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia.

Editorial Notices.

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